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The official announcement by President Mellen of a coming two-cent-a-mile rate for regular passenger fare on the Berkshire division of the New Haven system has been followed by much more expansive and radical propositions which only await the ratification of his board of directors. The new plans to be early adopted include (1) the two-cent-a-mile rate on the Old Colony system and the Highland, Northampton and Naugatuck divisions, to be extended a little later to the whole of the New Haven's system of approximately 4,200 single track miles; (2) at as early a period as possible the reduction of freight rates on the whole system also. The passenger reductions, we infer, are a matter now of only a few days, or, at most, weeks; the freight rate reductions probably tarry into the months or perhaps longer. The sweeping passenger reductions particularly have some very striking historical suggestions: In 1886 President Watrous announced the two-cent rate over the 135 miles of the company between Springfield and New York City, predicting, in a general way, as a result a loss of about $500,000 in passenger receipts for the following year. What actually came to pass next year (1887) was a gain of about $90,000 instead of a loss of $500,000—a blasted forecast, which gives fresh interest to President Mellen's new departure, which extends, almost at a stroke, the two-cent rate from one-eleventh of the single-track mileage of his system to the remaining ten-elevenths; nor does the fact that the change has waited twenty years in the coming detract from its interest now that it comes. Another striking phase of the change is the vivid side light that it throws on the values to the public of railroad consolidation. The numberless branches of the New Haven system all get the benefit now of the lower rate based on the immense passenger profits due to the density of passenger business on the main lines. To illustrate, the present Litchfield branch, about 32 miles long, and opened about 34 years ago, used to charge, as an independent line, 4 cents a mile and upwards. It is now to have a two-cent rate, a reduction of 50 per cent. from the old fare, and along with it has been secured a passenger and freight service on the branch incomparably better than the original. Whole tomes have been penned on the merits and demerits, the public vantages and public perils, of the great railroad consolidations of our times. But, trite as the statement is, the benefits of those consolidations to weak branch lines stand unquestioned. And, as proof of such benefits, the new move of the New Haven Company is the most recent, as well as a most lucid and impressive example.

Last week we printed President Hadley's *Boston Transcript* paper on the Hepburn bill in full. Since the appearance of that paper Senator Foraker has made in the United States Senate a long and carefully worked out address in opposition to the bill, some extracts from which are printed this week. It has occurred to a great many newspaper editors to contrast the positions taken by Senator Foraker and President Hadley, and many of the ablest of these editors have condemned President Hadley severely for what they evidently consider a species of temporizing with the problem. For example: "If intelligent men are to hold up their hands at the first demand of the demagogue, what chance is there of resisting his second and third demand? We shall have taught him the trick, and he will not be slow to apply it on every occasion. What need he care for your arguments, your warnings, your law, your precedents, your demonstrations, if you announce in advance that you will abandon them all if he only threatens loudly enough." It seems to us that these editors have allowed their very exemplary senses of justice to run away with their judgment and their understanding of President Hadley's position. As we understand this position, it is that of the highly practical economist who is concerned not with the passage of a bill or the attitude of a President, but with the broad question of the attitude of the American people to their railroads. Dr. Hadley might say with Robert Browning's Ogniben, "I have seen three and twenty leaders of revolts." If he had studied the question of railroad legislation less deeply he would perhaps have suggested amendments to the Hepburn bill to make it workable, but his conviction was so clear that this bill could not be made workable that, it seems to us, he turned his attention from the bill itself to the economical and political causes for the bill. He then saw a great movement throughout the country hostile to the railroads and to strong corporate interests, and it seemed to him highly desirable that this movement should die a natural death and not be perpetuated into a national party. It might be similarly argued that the enactment and working of the Potter law in Wisconsin was a prime cause for the death of the original granger movement in the '70s. But the Potter law, if we remember rightly, was never declared unconstitu-

tional; it merely worked the wrong way, benefiting no one, and retarding the development of the state. On the other hand, we think Senator Foraker has demonstrated that the Hepburn bill, besides being unworkable, is clearly unconstitutional as well, in many of its provisions. Need it, then, be so greatly feared?

AN EXPERIMENT IN REDUCED PASSENGER FARES.

"All local rates two cents per mile" is the announcement which since May 1, 1898, has headed the time-tables of the New York, Ontario & Western. This railroad was, we believe, up to the recent enactment of the Ohio two-cent-a-mile law, the only one on which a general rate of two cents a mile was in force. The New York Central, on its main line most of the way from New York to Buffalo, and the New York, New Haven & Hartford on certain sections of its main stems, have for some time had a two-cent-a-mile rate, but, except by mileage book, this has not yet been extended over most of the branch lines of either company. As may be guessed from the history of similar reductions, the adoption of the flat rate was not a voluntary experiment of the Ontario & Western's. Early in 1898 the New York legislature enacted a law providing that the railroads of the state should, in every case where their local rates were higher, sell 500-mile mileage books for $10. Rather than introduce a mileage book system, the New York, Ontario & Western on the day on which the new law became operative made a local rate of two cents a mile effective over its lines. Coincident with this, it withdrew its round-trip, 25-ride, and other reduced rate tickets. The immediate effect of this action was to slightly reduce local passenger receipts; the decreased earnings, according to the statement of the General Manager in the annual report for the year ended June 30, 1898, being due entirely to the reduction in passenger rates. Although the reduction was in force only two out of the twelve months of the fiscal year, the average rate paid per passenger per mile for the whole year was reduced from 2.064 cents to 1.839 cents. Before the reduction, the nominal rate had been three cents a mile. As a matter of fact, as is plainly shown by the average passenger mile rate for the preceding year, the company had not received anything like this rate on most of its passenger traffic. Aside from the very low rates on immigrant traffic—which class of travel, however, was of so comparatively small amount that it could not have had very great effect on the average for the whole—there were the usual classes of reduced rates, already alluded to, in force which brought down to nearly 2 cents the average passenger mile return to the company.

Thus the first year, which included two months under the new reduced rate, showed a loss to the company. In the next succeeding fiscal year, however—the first which included 12 months continuous operation under the low rate—there was an increase of 43 per cent. in the number of passengers carried and of 7 per cent. in local passenger earnings. More than this, the reduction in the local passenger rate was probably responsible for a stimulation of local freight earnings. The annexed table carries the story further. It gives for the fiscal years ending on the dates named the local passenger earnings of the road. These do not include through business, immigrant business, or business ticketed to and from connecting lines, but purely the local passenger earnings between stations. For better comparison, the statement includes the earnings for the two years prior to the reduction in the passenger rate. It also includes the percentage of increase for each full year since the rate reduction went into effect. As the figures for the current fiscal year are for six months only, an assumed percentage of increase for the whole year is obtained by multiplying the half-year's earnings by two in order to get a comparison with the previous full year. The resulting percentage of increase (38.11 per cent.) is probably somewhat overestimated, for, particularly on the New York, Ontario & Western, with its large summer resort business, July-December passenger earnings are normally larger than those in the six months from January to June; but the figure for the half-year makes it plain that the current full year's increase will be a substantial one. The table follows:

	Local passenger earnings.	Percentage of increase.
Year ended June 30, 1897...	$563,390	.....
" " " 1898...	560,633	.....
" " " 1899...	599,844	6.99
" " " 1900...	675,074	12.54
" " " 1901...	723,628	7.19
" " " 1902...	765,288	5.76
" " " 1903...	854,868	11.70
" " " 1904...	920,005	7.62
" " " 1905...	1,031,735	12.14
Half-year ended Dec. 31, 1905	712,472	38.11*

*Assuming the full year's earnings double the half year's.

This is a striking record of continued increase in local passenger earnings following a period in which they were stationary or slightly decreasing. In the six years, July 1, 1898, to June 30, 1905, inclusive, local passenger earnings increased $431,891, or 72 per cent. Provided this class of earnings for the current January-June six months shall amount to $487,216 or over, the local passenger revenue of the road will have doubled itself within seven years. The value of these increases to the company cannot, unfortunately, be absolutely proven without knowing what proportion of net profit was yielded by the increased business at the lower rate, as compared with net earnings under the old three-cent-a-mile nominal basis; yet without exact figures to cover this point, there seems little doubt that net passenger earnings for at least the latter part of the seven-year period would show almost if not quite as large proportionate increases as gross.

Here a reduction in passenger fares, which in all probability would never have been made voluntarily, has resulted within seven years in doubling earnings from local passenger traffic. The underlying principle is, we believe, one which might be much more generally acted upon by passenger traffic managers. A low and uniform rate is a most effective means of increasing passenger travel. Simplification of passenger charges to the extent that a man can go up to a ticket window anywhere on a road with the assurance that it will cost him (say) two cents a mile—no more and no less—to travel, and that the next man is paying as much as he and no less, has no small influence in increasing passenger earnings. Of course, the primary reason why a reduction like the Ontario & Western's increases passenger earnings is because it makes it cheaper to travel, but such a move also makes it *easier* to travel. Most travelers would be thoroughly glad to be relieved of the necessity of considering whether it will be cheaper to buy a round-trip ticket, or two separate fares, a through ticket or a combination of two locals, a five-day or a thirty-day ticket, involving the probabilities of whether one is likely to wish to stop over on either half of the trip, or to return by some other route, or to be able to come back within the time limit, or to comply with one or another of the numerous restrictions with which many railroad companies seem to believe it necessary to hedge about the daily life of the average passenger. Complications like these, which are often not clearly understood by passengers, add no more to their happiness than does the chance discovery at the end of a journey that a considerable saving might have been made in the cost of the trip by buying a different kind of ticket. A contented mental state is—or should be—a prime consideration for the passenger traffic manager to bring about in his patrons, for it has a strong, though somewhat indefinite, influence on the likelihood of later journeys. The instinct of travel is abundantly latent in American character, and, as has been time and again proved, needs only kind treatment for development to a remarkable degree. The psychological effect of a complication of passenger fares cannot be reduced to figures and accurately in dollars and cents proven a loss to the company; but it is there all the same, and most travelers do not have far to look to recall instances of such vexations. A low, uniform rate goes very far toward removing this hostile mental attitude. More than this, to the, unfortunately, always existent class of passengers who have no regard for a contract printed on a railroad ticket, and to that bane of the railroad company, the scalper, such a rate is admirably adapted. Unless the passenger attempts to evade paying fare on the train, he has no opportunity for dishonesty; and the scalper, no stock in trade for his business. The system, therefore, tends at the same time to the satisfaction of the honest and to the discomfort of the dishonest classes in the community, and increases passenger earnings for these reasons as well as for the primary reason that a lower rate stimulates travel.

It is, of course, obvious that there are a great many cases in which railroads cannot follow the example of the New York, Ontario & Western. For instance, no railroad which enters over its own tracks a large city like New York or Chicago could afford to abolish commutation fares or trip tickets, as was done by that road. Railroads in territory in the West, where population and travel are necessarily thin, could hardly be expected to put in force a two-cent-a-mile rate. Even in the comparatively populous state of Ohio, the general reduction by law to that basis will undoubtedly for some time work hardship to the more poorly situated roads. But the truth of the principle involved is not shaken by these exceptions. Even in the West some reduction and more uniformity in passenger fares might easily be a distinctly paying investment, considered in the light of ultimate advantage to the road. It would tend to stimulate travel, increased travel to stimulate busi-

ness and increased business to stimulate railroad earnings. In Ohio, it seems safe to say that in most cases it will not take very long to create enough new local traffic to bring net earnings to or above the old figure even on the weaker roads. Certainly, if the example of the Ontario & Western counts for anything, this is probable, for in New York State it has far from the best situation or territory to traverse.

In general, the lesson of cheaper and more uniform fares is one which can be more frequently taken to heart by passenger traffic executives. It carries with it large possibilities of ultimate increases in earnings, and, what is sometimes nearly as important, of increase in good will toward the railroad company. The interurban electric lines have pointed the way by their success in creating travel through convenience of service and low rates. If their policy could have been adopted in time, it would in many cases have gone far toward preventing beforehand their competition. But, entirely aside from this phase of the subject, the policy of low and uniform passenger rates is, on its own merits, worthy of much more general adoption.

SMOKE PREVENTION.

At a hearing in Philadelphia the other day sundry men and women testified that certain locomotives belonging to the Pennsylvania Railroad were making nuisances of themselves by emitting large volumes of smoke at all hours of the day and night. These persons urged upon the commissioners the desirability, nay, even the necessity, of doing something to put an end to the nuisance and clarify the air. It was urged that there were innumerable smoke-consuming and smoke-preventing appliances on the market which, if they were only to be applied to the offending locomotives, would cure the trouble and prevent the smoke. This testimony reads so well that the man who did not know would be convinced that it was only because of the greed of a great corporation that the defenseless citizens of the Quaker City were subjected to all this discomfort. Apparently it was only needful that a few dollars be spent and a little care exercised—and, presto! there would be no more smoke. It appeared, incidentally, from the testimony that the switching engines in the West Philadelphia yard were the worst offenders.

This would have made a strong case had not an official of the road testified that he did not know of any practical way to prevent smoke. It may have been dense ignorance on the part of the official, but it is an ignorance that is shared by a great majority of his fellows, who have to do with the locomotive. The citation of certain methods and devices that work well in preventing smoke on stationary plants is not helpful in its bearing on locomotive practice. The conditions of operation are so different that what is a success in one place is worse than useless in the other.

In order to obtain a clear understanding of what must be done to prevent locomotive smoke, it may be permitted to pass in brief review the sequence of firebox occurrences. When coal—we are considering soft coal—is thrown into the furnace there is an instantaneous production of large quantities of hydrocarbon gases. If these gases are evolved and held at a high temperature until they are mixed with the proper quantity of air for their combustion, they will burn without smoke and with the maximum of economy. If they are mixed with an excess of air, and still kept hot, they will burn to carbonic oxide, still without smoke, but with a great loss of efficiency. But if they are cooled below the ignition point, before they receive their air, and the soot is once formed, then there will be smoke, and the smoke consumer will be worthless; in fact, there is no such thing as smoke consumption. Smoke must be prevented from forming, or smoke will issue from the top of the stack. These conditions of high firebox temperatures, the proper admixture of the air and practically complete combustion, may be regulated successfully in the stationary plant. With an automatic stoker that feeds the fuel with constant regularity, with moving grates that keep the air spaces clear at all times; with a brick furnace that maintains a high temperature on all sides and dampers by which the flow of air through the grates and above the fire can be controlled, the combustion can be kept at the desired point of perfection and the smoke prevented from forming. But even here the full supply of air needed for perfect combustion is not admitted. It is cut down so that a slight haze appears at the stack, because it is more economical to waste a little heat in the formation of smoke than to waste large amounts in the production of carbonic oxide; and it has been found to be an impossibility to admit precisely the proper amount of air to produce that complete combustion wherein there is no waste due either to an excess of air or to the production of smoke. This chemical combination of combustion is exceedingly exacting quantitatively, and until all the coal used has the same composition for every shovelful, and the gases are liberated with the same freedom, we will be unable to produce perfect combustion on a commercial scale without waste.

When the requirements of the case are considered it is small wonder, then, that a motive power official said that he knew of no device that would do the work. In the case of a road engine that is working with comparative regularity for long distances, a fireman who will use the one-shovelful method of firing, and who will regulate the flow of air through the door with the utmost care, may, after he has learned the peculiarities of his engine and of his coal, be able to go over a division with comparatively little smoke production. But when it comes to accomplishing such a result on a switching engine, the difficulties seem to be pretty nearly insurmountable. An engine of this class will average a speed of something less than three miles an hour throughout the day. It will stand idle, and then run at actual speeds up to thirty or more miles an hour. It may be running light, or working to the full limit of its power. It will move first forward, then backward, and its fire will be in all conditions imaginable. All these wide variations will follow in quick succession and occur within short intervals of time, and the fireman or stoker that can follow all these changes and hold the fire in a condition to work just as it is desired that it should, at all times, is yet to be produced, and will be awaited until the end of time. When the engine is working hard, the smokebox vacuum may be 10 inches or more, and the air supply just right. The closing of the throttle drops the vacuum to almost zero, and the smoke pours from the stack.

It was asked, in the course of the inquiry, whether a brick arch would not help matters. It might, and it might not. If the arch is hot and the supply of air is all right, the gases may be held at or above the ignition temperature, and the combustion will then be satisfactory. Let us suppose that this condition exists just after fresh coal has been placed in the firebox, while the engine is at work. If the throttle is closed under these conditions, the supply of air is cut off by the loss of the draft, and yet the fresh coal continues to be baked by the incandescent fuel beneath and the hot arch above. The result is that the hydrocarbons continue to be distilled in large quantities, though perhaps in less quantities than before, and owing to the lack of air they drift over to the tubes, where they are chilled and the soot precipitated so that the stack belches smoke of the blackest, densest and richest kind. If the arch is cool it serves as a smoke producer when the engine is working, but will not cause as much trouble when it is standing.

These are only a few of the conditions that bring about smoke production in locomotives, especially those in switching service, and the people who declare that it is a very simple and easy matter to apply an effective remedy show how superficial their study of the problem has been. They count on almost superhuman intelligence on the part of the fireman, and a capacity to use that intelligence to its utmost throughout the whole day, despite fatigue and distractions; and they count further on such a harmony of mechanism and material as is never found in practice. In short, they count upon the impossible.

If the advocates of smoke abolition in railroad yards had but tried to introduce such a little thing as one-shovelful firing, and had learned the impossibility of getting the men to follow it they would realize in a small way what the task really is that must be performed to accomplish their desires. That the smoke nuisance can be somewhat abated there is no doubt, but to think that switching locomotives, burning soft coal, can be made to do their work successfully, without smoke, where the demand for steam and expedition is as urgent as it is in most cases, is to think the impossible.

Pennsylvania Railroad.

No transportation company in the country more accurately reflects general prosperity than the Pennsylvania Railroad. Its recent year, closed December 31st last, furnished a succession of earnings increases little short of marvelous. Month after month, particularly in the latter half of the year, gross earnings on the lines directly operated East of Pittsburg and Erie (excluding the Northern Central; Philadelphia, Baltimore & Washington; West Jersey & Seashore and Cumberland Valley railroads) showed increases ranging from one to two million dollars. These, too, were the months which followed not the lean half of 1904, but the latter part of that year when earnings were rapidly on the increase. Reports of the monthly earnings foreshadowed the remarkable returns of the year's show-

ing. On the lines East directly operated (excepting the roads already mentioned) gross earnings from freight traffic alone were over $100,000,000. This was an increase of $14,000,000 over the previous year's showing and of $10,000,000 over 1903, which up to now held the record for gross earnings. Gross earnings last year were $133,921,992 against $117,191,812 in 1904, an increase of $16,730,181. Net earnings from operation ($40,531,582) showed an increase of over $5,000,000. To these net operating earnings must be added interest from investments amounting to over $10,000,000 plus various other interest and profit items, a total of $12,036,918. This makes a total of $52,568,500 net operating earnings and other income. Deducting from this total $7,662,810 for rentals paid roads operated on basis of net earnings, and $14,803,173 in fixed charges of various kinds, there remains $30,102,517, the resultant net income for the year. This is an increase of $2,111,650 over the net income for 1904, which had hitherto been the most profitable year in the company's history as measured by this final statement of net income. These figures cover a system of 3,764 miles east of Pittsburg and Erie as against 3,748 miles in 1904.

The advance sheets now at hand contain condensed income accounts of "all transportation companies East and West of Pittsburg and Erie, owned, operated or controlled by or affiliated in interest with the Pennsylvania Railroad system." The total figures for the companies East (5,970 miles) are: Gross earnings, $176,288,208, an increase of $20,473,749; operating expenses, $125,732,473, an increase of $14,563,591; and net earnings, $50,555,735, an increase of $5,910,158. Interest, rentals, dividends and other charges, including extraordinary expenses and extraordinary expenditure funds, took $65,240,249, or practically all of the gross income. West of Pittsburg and Erie, the Pennsylvania Company shows an increase of $4,205,858 in gross and $1,201,432 in net earnings from operation; the Pittsburg, Cincinnati, Chicago & St. Louis an increase of $2,884,620 in gross and $730,899 in net earnings from operation. The aggregate of companies West (5,041 miles) shows the following figures: Gross earnings, $89,781,390, an increase of $8,379,429; operating expenses, $66,367,876, an increase of $6,023,297, and net earnings, $23,413,514, an increase of $2,356,131. Interest, rentals, dividends and other charges, including extraordinary expenses and extraordinary expenditure funds, took $29,407,470. Totals for the entire system (11,011 miles) rise to the remarkable figures of $266,069,598 gross earnings, an increase of $28,853,178 for the year, and $73,969,249 net earnings, an increase of $8,266,289.

Regularly a notable feature of Pennsylvania reports is the amount of money spent in extraordinary expenditures for betterments and additions. From the income of the year on the lines East, directly operated (3,764 miles), nearly eight and one-half million dollars ($8,424,881) was appropriated for revision of grades and alinements, additional tracks, yards, docks, bridges, piers, stations and other terminal facilities, abolition of grade crossings and improvement of equipment. There was also paid $3,249,238 on account of principal of car trusts. These were the appropriations from income. The charges to capital account on this same mileage during the year were as follows:

Cost of Road: Being expenditure on low grade freight line from York Haven to Glenloch; on Pitcairn, Enola, Hollidaysburg, Morrisville and other yards, Duquesne Way Elevated road, extension of four track system on main line, shops, stations, and other facilities	$18,151,688.23	
Cost of Pittsburg, Virginia & Charleston Ry., absorbed April 1st, 1905	11,618,019.93	
		$29,769,708.16
Equipment: 547 locomotives	$7,087,867.50	
Freight equipment	265,000.00	
	$7,352,867.50	
Less credits	29,164.99	
		7,323,702.51
Real Estate		1,647,547.43
Total charges to capital account for 1905		$38,740,958.10

Excluding the cost of the Pittsburg, Virginia & Charleston, this makes the aggregate expenditures for the year for construction, equipment and real estate on the Main Line between New York and Pittsburg $38,797,058 (this aside from similar expenditures amounting to $4,429,102 on the branch and auxiliary lines operated as part of the four grand divisions East)—an immense appropriation for the future betterment of the property. Nor is the past year's record a specially unusual one. During the last five years the sum total of charges to income and capital for betterments has been $152,708,727.

There is no more striking feature of the report than the activity of the Pennsylvania Railroad grand division (with branches, 1,799 miles). On this one division alone, earnings from freight traffic increased more than $9,000,000 over the previous year, and earnings from passenger traffic more than $1,000,000. Freight earnings were $63,217,008, or $34,781 per mile of road. Passenger earnings were $13,064,180, or $7,188 per mile of road, a total of $43,848 gross earnings per mile on this division. This, while not the largest gross earnings per mile in the system (the United Railroads of New Jersey grand division earning, gross, per mile of road, $52,372), represents by far the largest freight tonnage on the system. Even when one has stood at one of the stations between Altoona and Johnstown, or Altoona and Harrisburg, and watched the ceaseless succession of coal and freight trains which pass over the line it is scarcely possible to realize that on this one division alone were carried 92,582,616 tons, or 11,515,465,537 tons one mile; a freight traffic density for the division of 6,335,638 tons one mile per mile of road, or nearly twice that of any other division of this heavy tonnage system.

These figures lead the way to a consideration of the traffic statistics for the entire system. The whole freight and passenger movement on the lines, both East and West, is shown in condensed form below.

Traffic Statistics, Entire System.

	Freight, tons. 1905.	Freight, tons. 1904.	Ton-miles. 1905.	Ton-miles. 1904.
Lines East	200,791,219	173,002,860	19,387,458,170	16,570,807,393
Lines West	132,220,018	111,616,354	10,115,689,192	8,560,688,066
Total	333,011,237	284,619,214	29,503,147,362	25,131,495,459

	Passengers carried. 1905.	Passengers carried. 1904.	Passenger-miles. 1905.	Passenger-miles. 1904.
Lines East	97,743,104	92,077,411	2,252,040,943	2,081,295,039
Lines West	28,341,119	27,871,252	823,361,883	869,602,102
Total	126,084,223	119,948,663	3,075,402,826	2,950,897,141

These consolidated figures show that with the exception of a decrease in the number of passenger miles West of Pittsburg and Erie due, of course, to comparison with the year which included the long-distance passenger travel to the Louisiana Purchase Exposition at St. Louis, both freight and passenger traffic increased largely throughout the whole Pennsylvania system.

The year saw a net addition of 505 locomotives to the equipment of the lines East directly operated. These acquisitions added 20,000,000 lbs. to the tractive power of the equipment in service, or about 40,000 lbs. for each of the new locomotives; showing, as of course is obvious from the other features of the report, that most of them were heavy freight locomotives. In passing it is interesting to observe that on the Pennsylvania Railroad grand division anthracite and bituminous coal and coke furnished 49,947,927 tons out of the 92,582,616 tons carried, and the trainload was 524 tons; clear proof that this heavy tonnage was economically handled. The trainload for the directly operated lines East was 505 tons.

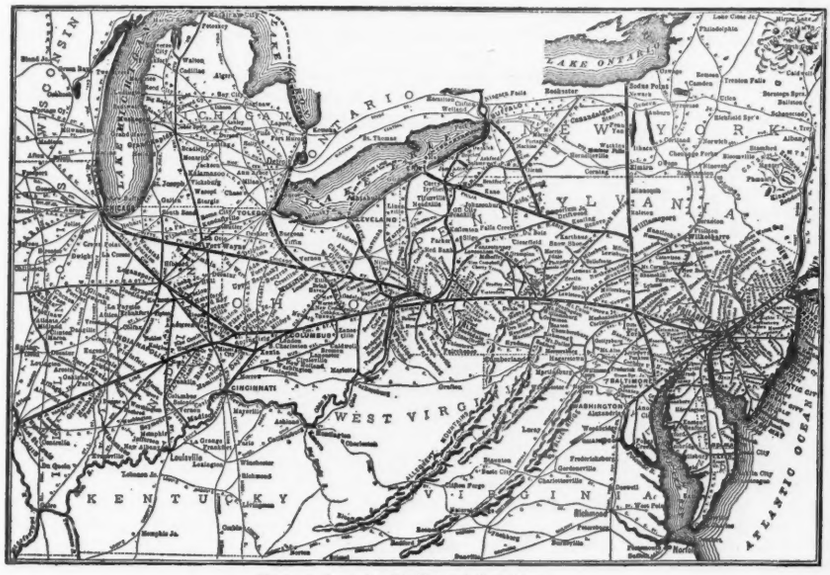
Many of the most interesting features of the report can best be summed up by the following extract from the general remarks of President Cassatt, included in the report:

The tonnage shows an exceptional increase both in volume and mileage over that of 1904, the traffic for the year being much the heaviest in the history of the company, and by reason of the liberal expenditures recently made in the construction of relief lines and large terminal yards and the substantial additions made to your motive power, the movement of tonnage has been materially improved. The prosperous conditions prevailing in the country are reflected throughout the entire system. There was a slight reduction in the average rate, and also in the net earnings per ton per mile, but owing to the volume of traffic carried, there was a large gain in the freight revenue. There was an increase in expenses in all departments, and notably in that of maintenance of equipment, due to the outlays necessary to keep your motive power and equipments up to the requirements of the traffic.

The heaviest outlay during the year was on the low-grade freight line from York Haven to Glenloch, Pa. Work was prosecuted vigorously, and the sections between York Haven and Columbia and between Atglen and Parkesburg are now in service. Between Columbia and Atglen and between Thorndale and Glenloch, grading is rapidly approaching completion, and the entire road will be finished in the early spring. Additional expenditures have also been made upon the yards operated at Enola in connection with this line, and facilities provided at Thorndale and Denholm on the Philadelphia and Middle divisions, through which four freight trains in each direction can be coaled and watered at the same time, and the delays avoided that now result from trains having to follow each other at intervals and wait while those ahead are being served. The yards at Harrisburg, Tyrone, Altoona, Pitcairn and Pittsburg have been further extended, the eastbound classification yard at Hollidaysburg enlarged, and provision made for an extensive westbound yard at the same point, for the classification of coal cars to be distributed over the Pittsburg division. At the Morrisville terminus of the Trenton cut-off, liberal yard facilities are also being furnished for the accommodation of the traffic passing over the New York Division. At Broad Street Station, Philadelphia, the express station has been rebuilt, and the widening out and lengthening of the tracks on the south side is under way. At East Liberty, Pittsburg, a new passenger station is being erected, which will furnish adequate accommodation for the large travel at that point. The elevated road on Duquesne Way and the car-load delivery yard have been completed and the freight houses are under construction. On the Pittsburg division, the four-track system has been finally completed between Bolivar and Blairsville Intersection, and work

is being pushed between Beatty and Donohoe, and on the revised line between Beatty and Southwest Junction. The second track on the Western Pennsylvania division between Tunnelton and Saltsburg has been completed. A jumpover has also been constructed at Ehrenfeld to prevent interference by the South Fork coal traffic with the main line movement. On the middle division, the four-track system on the Canal line at Newport has been put in service, and also the stone arch bridges constructed over the Juniata on the new four-track line between Granville and Mayes. On the Philadelphia division, the elevation above high water of the tracks along the Susquehanna river between White House Road and Harrisburg has been completed. On the United Railroads of New Jersey division, the principal items of outlay, outside of the Greenville Yard, were for the improvement of pier and yard facilities at New York and Harsimus, the extension of the Waverly yard, the reconstruction of the Princeton branch, the erection of the Trenton Shops and the elevation of tracks in Camden. The improvement of the Greenville yard was further continued, and a large sum expended in filling, dredging the channel, construction of lighterage and coal piers, and furnishing other facilities.

One of the most important matters which received attention during the past year was the providing of a sufficient water supply for present and future needs. Owing to the largely increased demand arising from the growth of the traffic, the former sources of supply had become inadequate, and on the lines traversing the coal districts the quality of the water was rapidly becoming unfit for locomotive use. Arrangements have now been made, through contracts with companies organized and owned by the Pennsylvania Railroad Company, to secure an adequate supply of good water at all points of the main line between Pittsburg and New York, and also on the more important branches, and for the construction of the reservoirs and the piping of the water to your lines whence it will be distributed along the right-of-way to the necessary points. The cost of this undertaking will be large, but it will be of incalculable value; while the difficulty in obtaining water in sufficient quantity and of good quality shows that this step could not have been longer delayed. It is proposed to obtain the funds for this outlay by an issue of special securities maturing at short periods, and as there will be a large saving both in cost of water and in boiler repairs, the principal and interest thereof can be met, without undue burden, out of your current income. It was found absolutely necessary also to largely increase the motive power in order to meet the exceptional demands of the traffic. Substantial additions were made to the passenger equipment, and arrangements concluded for the building of a large number of standard freight cars, to replace equipment of small capacity. It was deemed wise to make these replacements at once, instead of distributing them over a period of years. And while the equipment absolutely owned by your company will show a temporary decrease until the maturity of the Car Trusts under which the standard equipment is built, the number of cars available for service is not diminished, while the tonnage capacity is largely increased. Contracts have also been let covering the addition of twenty thousand cars to the freight equipment of the system under the usual car trust arrangements.



Pennsylvania Railroad System.

On the branch and auxiliary lines directly operated east of Pittsburg the largest expenditure was upon the Cambria & Clearfield, Cherry Tree & Dixonville, Western New York & Pennsylvania and Allegheny Valley railroads. The main items upon the first named road were the construction of the Barnesboro tunnel for second track, and the improvements to the line between Amsbry and Irvona to accommodate the business of the New York Central lines. The outlay on the Cherry Tree & Dixonville road was in the construction of track, sidings and branches necessary to provide for the joint business handled by your own and the New York Central interests, in accordance with existing contracts. The construction of a branch is now under way from West Brownsville Junction up the valley of the Monongahela, 4½ miles, where it will connect with the Pennsylvania, Monongahela & Southern Railroad, which is being built to further develop the Monongahela valley. On the Western New York & Pennsylvania, the principal expenditure was on yards and shops at Olean, on canal and dock facilities at South Buffalo, on the Ebenezer yard, and on right of way and real estate. On the Allegheny Valley the outlay was mainly on the second track from Rimerton to Phillipston, on the Coleman, Phillipston and Cochran yards, and on sidings, right of way, and real estate.

Expenditures for the current year will include the extension of the four track system on the Middle and Pittsburg divisions, and the necessary revision of alinement and grades connected therewith. This work, which is being pushed as rapidly as practicable, will complete the four tracks between New York and Pittsburg with the exception of two three-track sections, one of seven miles between Spruce Creek and Tyrone Forge, and one of 3½ miles immediately east of Conemaugh. This will, however, not obviate the necessity for the construction of additional relief lines for the Pittsburg and New York divisions. As already stated, the low-grade freight line between York Haven and Glenloch will be placed in service in a few months, and will then furnish an entirely independent route, with maximum grades of three-tenths per cent. against eastbound and six-tenths per cent. against westbound traffic, between Marysville and Morrisville, 137 miles. Another double-track relief line is in operation between the eastern end of the Allegheny mountain tunnels and Petersburg, on the Middle division, 47 miles. These two lines will amply provide not only for the prompt movement of the present traffic between the points named, but for a large increase; but it will be necessary to proceed at once with the construction of an additional freight line about 50 miles long, between Morrisville and Newark, and of one between Glenloch and Philadelphia about 20 miles in length, and also to relieve the Pittsburg division by building an independent line between Pitcairn and Blairsville, 43 miles, and between Johnstown and Altoona, 39 miles. Whether the latter lines should be for passenger or freight service is a question that is now being carefully studied; but whether for passenger or freight, it is deemed best from an operating standpoint, that the relief lines shall be entirely independent rather than that two additional tracks shall be laid alongside of an existing four-track railroad. The necessity for the prompt construction of these relief lines will be apparent when it is stated that the average daily movement of freight cars over the Allegheny mountain summit for October, November and December, 1905, and January, 1906, was 5,669 cars, with a maximum movement in 24 hours of 6,974 cars; that there is a daily average passenger movement of 28 trains in each direction; that freight trains require two assisting locomotives on the eastern and one on the western slope, and that on the eastern slope passenger trains also must have an assisting locomotive. The daily average number of independent train units passing over the eastern slope during the months named, including assisting locomotives when descending without trains, but not counting them as separate units when attached to trains ascending the mountain, was 168 in each direction. It should also be noted, as indicating the provision that should be made for the future, and the increase in tonnage on the line between New York and Pittsburg during the last five years was 40 per cent., and in ton-mileage, 32 per cent. With the completion of the relief lines referred to, you will have a double-track railroad between Pittsburg and Philadelphia and New York entirely independent of your four-track road, with the exception of the section on the Middle division between Petersburg and Marysville, 96 miles, and the short section between Parkersburg and Thorndale on the Philadelphia division. But it is believed that the first of these sections will not require relief for some years, as its very low grades admit of heavy trains and a consequent relatively small number of train units.

The construction of the tunnel line into and through the city of New York has been steadily prosecuted during the year. All the real estate required for the terminal station has been purchased and also the greater portion of that needed for the terminal yard in Long Island City. On the section between Newark and the Hud-

son river, the draw-bridge over the Hackensack river is under contract, and the work on the Bergen Hill tunnel, which is being driven from both ends, is to be further expedited through the central shaft, from which headings are driven in both directions. In the North River tunnels, the shields are at work on both sides of the stream, and it is confidently expected that they will be connected and the iron lining in place before the end of the year. The excavation for the station site and the building of the retaining walls are steadily progressing; the power house from which the terminal station will be operated is under construction, and the tunnels under the city of New York are being driven westward from the main shaft at First avenue and also in both directions from the intermediate shafts located on Thirty-second and Thirty-third streets between Fourth and Madison avenues. On the East River section, the shields on the Manhattan side are in place and working towards the river; and, while the shafts on the Long Island side are not yet completed, a considerable amount of work has been done between those shafts and the eastern portal of the tunnels in Long Island City. The power house in that city is in service and is supplying the electric lines of the Long Island Railroad. Nothing has occurred to seriously delay the progress of the work or to suggest any special difficulties in carrying out the general scheme of construction.

Large expenditures were necessary upon the Philadelphia, Baltimore & Washington; Northern Central; Long Island, and West Jersey & Seashore, in the elimination of grade crossings, construction of additional tracks, erection of stations and other terminal facilities, improvement of bridges, electrification of lines, and the increase of motive power and equipment. On the West Jersey & Seashore it has been determined to electrify the line via Newfield to Atlantic City and thus furnish increased facilities for reaching that important resort. In pursuance of the policy heretofore authorized, your company has placed its guaranty upon a further issue of $5,691,000 of the 4 per cent. refunding bonds of the Long Island Railroad Company, and in conjunction with the other companies, which are co-owners with it in the line between Washington and Richmond, has guaranteed an additional $2,000,000 of the Richmond-Washington Company's 4 per cent. collateral trust bonds.

Following action taken at the last annual meeting, the Pittsburg, Virginia & Charleston was merged into the main line on April 1, 1905. The Pennsylvania Railroad Company having been the owner of more than two-thirds of the capital stock of the South West Pennsylvania Railway, which was built as a feeder to the system, and which, branching from the main line at Greensburg, extends through the coke region to Connellsville and Uniontown and to a connection with the Monongahela division, it was deemed wise to acquire the small amount held by outside parties; and it is proposed to also consolidate this road with the main line. There will be submitted for approval at the annual meeting the necessary resolutions to this effect; and like resolutions will also be submitted covering the absorption of the York Haven & Rowenna Railroad and the Allegheny Valley Railway. The York Haven & Rowenna is a link about five and one-half miles long in the freight line which is nearly completed from York Haven on the Northern Central via Columbia to Glenloch on the main line, as hereinbefore fully explained. As it does not lie in one of the counties through which the Pennsylvania Railroad passes, and therefore could not be built under that company's branching powers, a separate charter had to be taken out for its construction until it could be absorbed. The Allegheny Valley forms the connection through its river and low grade divisions between the main line at Pittsburg and the Philadelphia & Erie at Driftwood, and also furnishes through its line to Oil City and over the Western New York & Pennsylvania a direct route to Buffalo, Rochester, and other important trade centers. Its terminals at Pittsburg are of great value, and its location along the Allegheny river makes tributary to it a territory already largely devoted to steel and other manufacturing industries, and one capable of increased development in the future. As the company is a guarantor upon its outstanding funded debt, and owns or controls more than three-fourths of all its stock, it is deemed advisable to acquire the comparatively small amount held by outside parties and make the road an integral part of the main line.

This summing up by the President of the accomplishments of the year and the necessities of the immediate future, together with the actual figures of the report, help to give fresh realization of the wonderful strength of the Pennsylvania. There is no need to comment upon the traffic wealth of its territory, for only the extent of its future possibilities is unknown. Next to location, its most important asset is a continuity of successful management, such as is capable by judicious economy in a year like 1904, when gross earnings decreased four and a half millions, of showing the largest net income in the company's history. Last year goes on record as the high water mark of the Pennsylvania's prosperity, but other records have been short lived. Already returns for the first month of 1906 show a larger increase over the corresponding month in 1905 than any of the 1905 monthly increases. What new traffic levels the future has in store for the company it is not safe to guess.

The following table includes the principal operating statistics for the Pennsylvania Railroad Company (lines east of Pittsburg and Erie, directly operated):

	1905.	1904.
Mileage worked	3,764	3,748
Freight earnings	$100,093,828	$86,014,076
Passenger earnings	27,392,393	25,438,978
Gross earnings	133,921,992	117,191,812
Maintenance of way and structures	15,121,800	12,789,398
Maintenance of equipment	24,363,199	19,753,563
Conducting transportation—traffic	1,435,417	1,357,113
Conducting transportation—operation	49,473,234	45,129,423
Operating expenses	93,390,410	81,802,988
Gross income*	145,958,910	129,559,534
Net income	30,102,517	27,990,867
Extraordinary expenditures from income.†	8,424,881	6,220,921

*Sum total of all receipts.
†Not including car trust payments.

NEW PUBLICATIONS.

Rapid Transit in New York City and Other Great Cities. Prepared by S. D. V. Burr under the direction of a special committee of the Chamber of Commerce of the State of New York. 1906. Cloth, 295 pages.

In April, 1904, a special committee of the New York Chamber of Commerce was appointed to outline a plan to suitably recognize the services of the members of the chamber who had so loyally and honorably served the City of New York as members of the Rapid Transit Commission. This committee suggested the preparation and publication of an historical memoir of the rapid transit enterprise then nearing completion and the awarding of gold medals to the past and present members of the Rapid Transit Commission. On Dec. 7, 1905, at a meeting of the Chamber of Commerce, these medals were presented to Alexander E. Orr, Morris K. Jesup, John Claflin, Woodbury Langdon, Seth Low, John H. Starin and Charles Stewart Smith with appropriate ceremonies. The memoir suggested has just been issued.

Historically the book is of great interest and value, going back to the earliest settlements on Manhattan Island. The gradual growth of the city, its changing centers of business and population and early plans for relief are matters about which there has heretofore been little collected information. The subsequent chapters take up the building of the East river bridges, the tunnels under the Hudson and East rivers, the elevated railroads, early Rapid Transit Commissions and the organization of the Commission which planned and caused to be built the present Subway. A full description of the engineering and operating features of the Subway follows. Rapid transit in other great cities is taken up in Chapter XX., and the facilities of London, Berlin, Budapest, Paris, Glasgow, Boston, Chicago and Philadelphia are briefly considered in order. A summary of the present rapid transit laws in New York and the report of the proceedings of the meeting when the award of medals was made concludes the book. The work of compilation represents many months of patient delving in obscure reports and long-forgotten publications. It has been well and carefully done and the result is a memoir befitting the occasion for which it was prepared.

Practical Electrical Railway Handbook, 1906. By Albert B. Herrick. New York: McGraw Publishing Co. Leather, 4½x6¾ in.; illustrated; 460 pages, including index. Price, $3.

This is the second edition of this useful and comprehensive work. The author covers the various branches of electric railway construction and operation, as the headings of the nine sections into which the book is divided will show: General Tables; Testing; The Track; The Power Station; The Line; The Car House; The Repair Shop; The Equipment and The Operation. Under general tables is included the usual information found in hand books as well as such data as is particularly adapted to electrical work, such as the relative resistance of conductors. The section on testing describes and illustrates various methods and kinds of tests, such as testing rail bonds, motors and other equipment. Considerable space is also devoted to describing the different ways of determining the current flow in water pipes. Types of track construction are explained in the section on track, and illustrations of a number of typical sections are given, with tables of approximate cost per mile of single track. Under power stations, there are numerous suggestions as to the design and equipment of stations and illustrations showing the various types of equipment and general plans of power houses are shown. Various methods of wiring are also considered at length. The section on line includes descriptions and illustrations of line splices, poles, both wood and metal, various types of cross arms, bonds and bonding, manholes and conduit construction and general distribution of current. The construction, heating, transfer tables, doors, floors and general lighting of the car house are briefly described under the next section. Under repairs, is given a general description of the arrangement of the repair house and suggestions as to its machine equipment, including a table showing the number of machines required in houses designed for 30 cars, 60 cars and 300 cars respectively. Some 70 pages are devoted to a general description of equipment, including rolling stock, car bodies, car frames, trucks, motors, wiring and air-brakes. The section on operation covers ten pages and briefly describes

schedules and speeds and signal systems. A list of questions for examination of motormen is also given. The use of formulas and mathematics has been eliminated as much as possible, so as to make the text useful to as many as possible of those interested in the subject. It should be a satisfactory handbook for practical use.

TRADE CATALOGUES.

In 1894, the Master Car Builders' Association, for convenience in the filing and preservation of pamphlets, catalogues, specifications, etc., adopted a number of standard sizes. The advantages of conforming to these sizes have been recognized, not only by railroad men, but outside of railroad circles, and many engineers make a practice of immediately consigning to the waste basket all catalogues that do not come within a very narrow margin of these standard sizes. They are given here in order that the size of the publications of this kind, which are noticed under this head, may be compared with the standards, and it may be known whether they conform thereto.

Standards.

Postal-card circulars	3¾ in. by 6⅛ in.
Pamphlets and trade catalogues	3½ " by 6 "
	6 " by 9 "
	9 " by 12 "
Specifications and letter paper	8¼ " by 10¾ "

Auxiliary Field Direct Current Motors.—Circular No. 1,117, issued by the Westinghouse Electric & Manufacturing Co., Pittsburg, Pa., illustrates and describes in detail the general construction and operation of its type SA motors. These motors are of the direct-current variable speed type and are fitted with auxiliary fields. They are specially adapted to meet the demands of service requiring a wide range of speed variation. A brief detailed description of this motor was given in the *Railroad Gazette* of March 2, 1906.

The Sullivan "Plug" Drill.—A nicely gotten up 12-page pamphlet published by the Sullivan Machinery Company, Chicago, illustrates and describes in detail the Sullivan "Plug" drill which is extensively used for quarrying and contracting work. In a test held at Barre, Vermont, 160 holes 3 in. deep by ⅝ in. in diameter were drilled in one hour with the drill. The air pressure averaged 100 lbs., and the estimated consumption of free air was 15 cu. ft. per min.

Car Lighting.—The Safety Car Heating & Lighting Co., New York, presents in a special catalogue some details of its new incandescent mantle lamps for burning Pintsch gas, by which a steady white light is produced and the candle power of the gas is increased more than three times over the old standard burners. Sections of various types of lamps are shown, together with illustrations from photographs of the lamps. The new designs of lamps, while differing radically from the older standard designs, are characterized by the same artistic appearance. The only change necessary in the piping and apparatus in the car is fitting a different regulator, which maintains an outlet pressure of 1 lb. per square inch. The 1906 edition of the general Pintsch gas catalogue of this company, also just issued, contains 191 pages and illustrates all the car-lighting fittings used with Pintsch gas. Both catalogues are paper bound, 8¼ in. x 10¾ in.

CONTRIBUTIONS

Injunctions Must be Specific.

TO THE EDITOR OF THE RAILROAD GAZETTE:

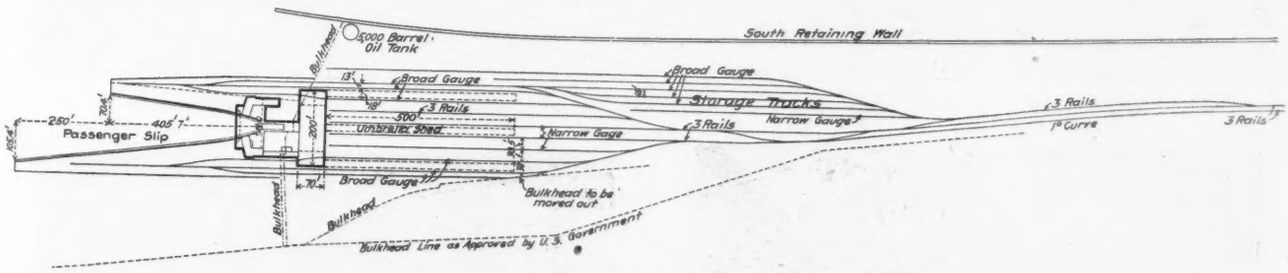
The Supreme Court of the United States has sustained Attorney-General Moody in the position that he took in regard to the case against the Atchison, Topeka & Santa Fe. That road was charged with granting rebates on coal transported for the Colorado Fuel & Iron Company. Mr. Moody held that contempt proceedings could not be successfully prosecuted for violation of the restraining order issued in 1902, prohibiting a departure from the published tariff rates on packing house products, dressed meats, grain, grain products, or any other interstate traffic, because coal had not been included in the articles specified; because the general words "or any other interstate traffic," according to the well-established rule, could be construed to extend only to articles of like kind with those specified. This view is now fully sustained by the decision handed down by the court a few days ago in the Chesapeake & Ohio coal case. In this case the Supreme Court after disposing of the main question involved, passed upon the very question emphasized by the Attorney-General in the Santa Fe case. Discussing the claim that instead of enjoining the Chesapeake & Ohio from the particular violation of law involved, the court should have enjoined the defendant railroads, in general terms, from violating the Act to regulate commerce in any particular, the Supreme Court holds that an injunction of such a general character would be "violative of the most elementary principles of justice," and that granting it would be to lay down a rule which would be "destructive of the fundamental liberties of the citizen."

After Messrs. Judson and Harmon retired from the Santa Fe case, contempt proceedings were begun against the road before Judge Philips, who had issued the original retraining order. Judge Philips held that an injunction must be predicated on some specific wrong; that the bill on which the order was based contained specific complaint only as to rebates on packing house products and grain, followed by a broad, general averment, based on information and belief, that on many other principal articles of traffic, necessities of life, rebates were also granted; that the restraining order enjoined the railroad company from transporting such specified articles "or any other interstate traffic" at greater or less rates than those named in the published tariffs, and declared that the general words "or other interstate traffic" were controlled by the antecedent specifications and limited to traffic of like kind. Judge Philips also held that there was no evidence to furnish any foundation for imputing to Mr. Morton or Mr. Ripley any personal responsibility for the alleged violations of the interstate commerce law.

G. G. G.

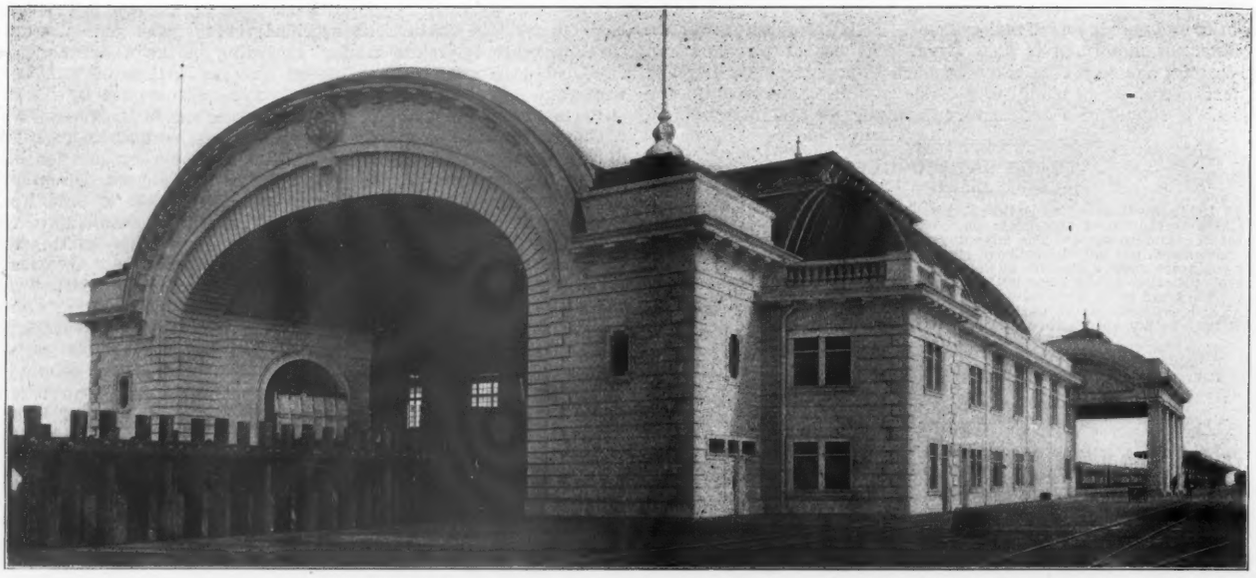
New Station of the Southern Pacific at Alameda Mole.

The city of San Francisco is located, as is well known, on a long narrow peninsula on the western side of the bay of San Francisco. All the important railroads terminate on the eastern shore of the bay, necessitating a very complete and elaborate system of ferrying, both for freight and passenger service across the bay. Of such service the oldest and by far the most complete, the best arranged and handled is that of the Southern Pacific Company. Besides its various freight terminals for handling freight, both in bulk and small lots, and its facilities for handling express and wagons over separate ferry lines, this company has two important passenger ferry stations, each located at the end of a long, narrow artificial mole, made by filling in a strip between rock walls, and crossing the shoal water of the easterly side of the bay so as to reach deep water for the ferry boats. These ferry terminals consist essentially of three parts. A slip, or as it is sometimes called, a ferry rack, consisting of piling and wharf work, and having two wings, one on each side, approximately fitting the outlines of the boats. At the head of this slip is a depot for the accommodation of passengers, baggage, etc., beyond which again is a trainshed for the protection of passengers and baggage to and from the cars.

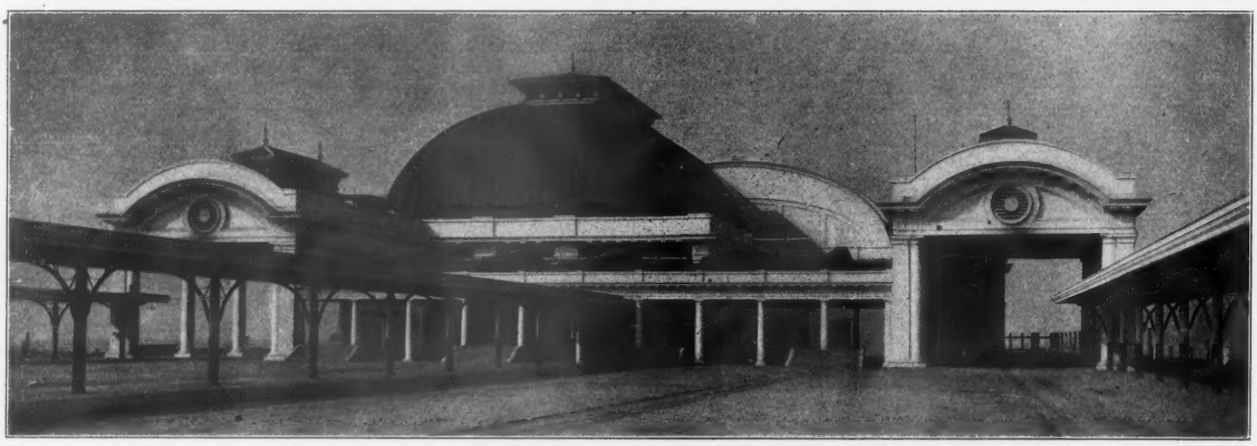


Plan of the Alameda Mole of the Southern Pacific Co., California.

About two years ago the more southerly of these two passenger terminals, known as the Alameda Mole, was destroyed by fire, and it was decided by the Southern Pacific Company to replace this with a very elaborate, ornamental and up-to-date structure, which has just recently been completed. The slip follows the usual construction of the Southern Pacific, consisting of two long legs or wharves, with a row of fender or spring piles between, attached to each other by elastic waling pieces, and approximating in shape the outline of the boats. When a boat has entered the slip there are three passenger aprons through which communication can be had with the shore: one in the center of and at the forward end of the boat on the lower or main deck, and one on each side of



Elevation of Southern Pacific Passenger Station at the Alameda Mole.



Exterior of Train Shed, Alameda Mole.

Upper Waiting Room and Ramp to Lower Floor.

Interior of Train Shed, Alameda Mole.

the upper deck, just forward of the saloon, so that passengers can leave the boat for the shore, or enter the boat from the shore in three different directions.

When a boat is in the slip its forward end back to the pilot house is entirely covered by a roof, which is a large elliptical arch

Interior of Upper Waiting Room, Alameda Mole.

spanning the slip. Under this roof are also the three aprons above mentioned, so that passengers, baggage, etc., can leave the boat entirely under cover. At the head of and communicating with either of these aprons is the main head-house or ferry building. This head-house is two stories high and is covered with a large rectangular dome, which forms the ceiling of the upper or ladies' waiting room. Passengers leaving the upper deck of the boat pass outside the waiting room down long inclines to the rear of the main building. Passengers leaving the lower deck pass across the central apron through a corridor to the rear of the building.

To the rear of this main building or head-house is a covered concourse 70 ft. wide, which extends across the entire rear of the building and is flanked on either end by train-sheds of the same width as the concourse. Still further to the rear, between each pair of tracks and connecting with this concourse, there are umbrella sheds of artistic design. They are 18 ft. wide and 500 ft. long, so that passengers can go from the train by way of the umbrella sheds and concourse to the boats always under protection from the weather. From this concourse there are entrances to the left facing the slip so that passengers leaving the boat on the upper deck incline to the right or left do not cross those seeking to enter the boat from the waiting rooms. The first story waiting room or main floor contains ticket office, news stand and smoking room, and from this floor leads a broad stairway to the large general waiting room on the second floor. On the second floor, in addition to the general waiting room, are the local terminal offices such as trainmasters', despatchers', conductors', ticket takers', etc.

The character of architecture employed is French Renaissance. The concourse is spanned with low flat trusses supported on Doric columns. The train-sheds at each end of the concourse run up to a height of two stories, and have curved or barrel-shaped roofs, and there is a lantern parallel with their axes for ventilation. These sheds are also supported by large Doric columns.

The domed roof of the head-house is supported upon steel trusses and its form was carefully studied as regards appearance and outline. The waiting room on the second floor is very ornate in detail and design. The ceiling is domed and hipped with highly ornamental moulded panels between the roof trusses so that the paneling is both horizontal and transverse. In the center of the dome three large ceiling sashes give light from the lantern above. At the spring line of the dome a cornice of classic and ornate design runs entirely around the room. Between the southerly incline and the waiting rooms the roof is supported on Doric columns ornamented. The waiting rooms and inclines are separated by wrought-iron grill work 7 ft. high.

The color scheme in the waiting rooms is old ivory, with the high points of the enriched members almost white, producing a very pleasing and harmonious effect in quiet tones. The exterior of the building is white, which makes it a conspicuous object in almost any weather. There are a great number of artistically arranged electric lights, as the domed roof of the second story waiting room and the arched roof over the end of the slip give an opportunity for elaborate treatment of this kind. At night when a boat enters the slip the elliptic roof is lighted up with a great number of incandescent lamps, which flood with light the boat and all the aprons, producing a very agreeable effect and preventing any confusion in the handling of passengers or baggage from insufficient lighting. The transverse and horizontal lines of lights, spaced at equal distances, give a brilliant effect. As the time for the arrival of a boat approaches the light is turned on, illuminating the entire slip, and making it very convenient for steering the boats.

It was necessary to place this building partly on piles and at the same time keep it isolated from the slip because in stormy weather a boat striking the fender piles might cause considerable vibration in the building. This is the only building of this description in or around the Bay of San Francisco which is artistic and pleasing from whatever direction viewed, whether from the bay, from the shore or from either side, and the impression is not merely that of a train-shed, but of a monumental building dedicated to public use, along ornamental but at the same time dignified lines.

The building was built by the maintenance of way department

Interior of the Lower Waiting Room.

under Mr. J. H. Wallace, Engineer of Maintenance of Way. Mr. J. D. Isaacs, Consulting Engineer of the Harriman Lines, designed the structure and supervised its construction. The plans and details were prepared by Mr. D. J. Patterson, Architect of the Maintenance of Way Department.

Railroads and Foreign Enterprises in Korea.*

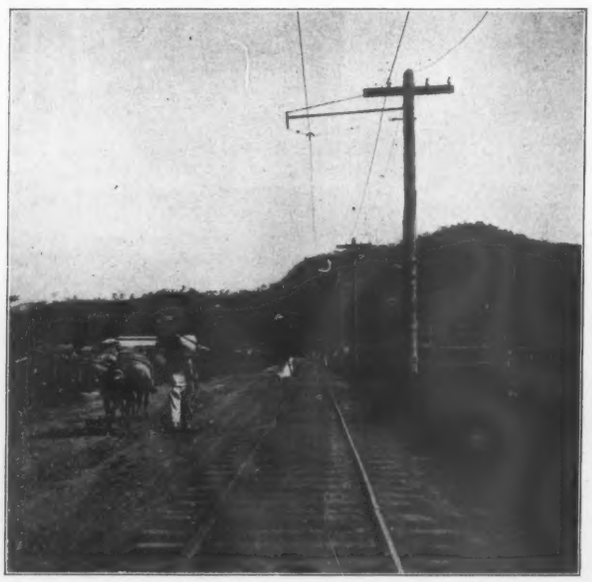
BY L. E. BENNETT.

In September, 1905, the writer had occasion to visit Korea in order to inspect and make a report on the Seoul electric street railway system for Messrs. J. G. White & Co., of New York and London. The paper which follows contains such parts of this report as are of general interest in their discussion of the interior communications of the country, together with other notes on points of interest not only to those who are interested in Korean railroads from the standpoint of the economist or of the investor, but also to American manufacturers of railroad supplies.

The area of Korea is about 92,000 square miles, and the present population is about 8,000,000, or about 87 inhabitants per square mile; but the country is capable of supporting double this population. At the time of the Japanese occupation of Korea, American capital and enterprise had been most successful in developing transportation facilities in the hermit kingdom. Development of the country itself has been very slow, and there are large areas of good uncultivated land, including extensive tracts of excellent grazing land for live stock.

The temperature in summer is from 70 to 100 degrees Fahrenheit, and in winter from 0 to 30 degrees. The weather during winter months is dry, clear and crisp, and Korea is an exceedingly healthy and agreeable climate the year round. Summer, winter, autumn and spring are about the same as northern New York, except that they have a more clearly marked dry season and rain season. The rainfall is about 60 inches per year, and the months of heaviest rainfall are June, July and August.

The Korean people are very ignorant and superstitious, but



Suburban Line.

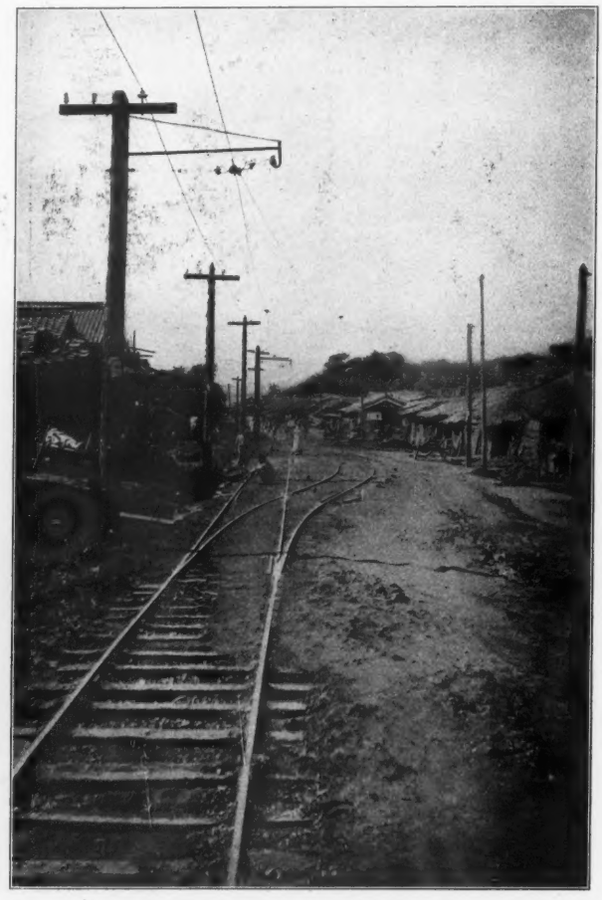
naturally peaceful and easily managed if let alone. They are a strong, hardy race, but not very thrifty, and do not accumulate property or wealth. This is owing chiefly to centuries of abuse and robbery on the part of a corrupt official class. Their stock is a mixture of Tartar and Mongolian blood, having almost the same origin as the Japanese. They are almost exclusively an agricultural people. The average Korean does not work for wages, but cultivates the soil. He tries to raise, for sale, only a sufficient surplus to buy such necessary articles of foreign and domestic manufacture as may be absolutely essential, and such as his family is unable to manufacture or produce. The average earning power of a Korean is probably not more than 20 cents per day.

The labor supply is not at all efficient, but is ample for any public works. A common laborer earns from 20 cents to 30 cents per day in the interior, and at the seaports from 30 to 40 cents. Korean skilled labor scarcely exists, but there is plenty of Japanese skilled labor available in Japan which can be imported at small cost. The rate of wages for Japanese skilled labor in Korea is from 80 cents to $1.50 per day, according to the kind of work and skill of the laborer.

One military school and four government language schools exist in Seoul. These latter teach only foreign languages. The mission schools, which are supported and run almost entirely by the American missionary societies, are the best schools in the country. In the interior all education is by private arrangement on the part of the parents of the families with some private tutor. There is no public school system and no educational facilities to speak of in Korea. Few people know how to read and write, and it may be said that education is limited almost entirely to the higher class of Koreans, with the exception of the pupils in the foreign missionary schools. No doubt the Japanese will start a public school system now, as the Koreans would have done themselves if left alone.

The Korean people are exceedingly superstitious, just as the Chinese and other ignorant masses of people are, but they are quite bright and capable of quick learning.

The Japanese are said to maintain a present military force of about 50,000 soldiers in Korea. At present the country is in an unsettled state of transition from Korean to practically complete Japanese rule, and it is impossible to say how the new Japanese government will work out. Scant respect has been shown for the rights and desires of the Korean people and government by the Japanese military force, which has administered martial law in the country up to the present time. The Japanese have abused the Koreans and seized their property under the pretense of military necessity, but in reality the land is afterward occupied by Japanese farmers who cultivate and use it for anything but military pur-



Track and Overhead Structure.

poses. The country swarms with low adventurers from Japan of the coolie class, who are reported to have seized property and exacted signatures to deeds of transfer to themselves by force, and unfortunately the Japanese military authorities seem to have protected these adventurers in their abuses and have persistently refused to listen to the Korean side of the controversy, but have supported all Japanese in the possession of their dishonestly acquired possessions.

The finances of the Korean government have been controlled by a Japanese financial adviser, who, it was asserted, refused to allow even the Korean Emperor to expend his own private funds without the previous consent of the adviser.

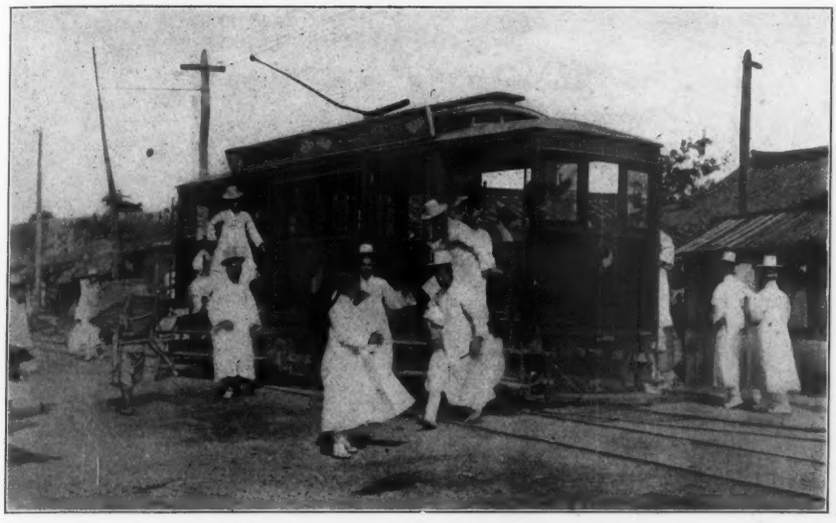
Now that Marquis Ito, one of the greatest men of Japan, has gone to Korea to establish a civil government and has turned out of office the old financial adviser and many others who were connected with the provisional military government, it is hoped and believed that the Japanese government will give the Korean people a "square deal" and protect them in the possession of their property rights.

But even the Japanese government has a different idea of fair

*This is the third of a series of papers written for the *Railroad Gazette* by Mr. Bennett. The first two dealt with the Philippines and the next will describe the interior communications in Siam.—Editor.

dealing from ourselves. For instance, the government is reported to have seized all the telegraph lines in the country which belonged to the Imperial Korean government, turned out all the Korean operators and replaced them with Japanese telegraph operators and proceeded to charge the Korean government 10 sen (Japanese money) per word to send messages over their own lines, while the Japanese government paid only 5 sen per word for the use of the Korean telegraph lines.

These are, howeyer, very likely only some of the inevitable abuses which occur with every war, and no doubt the Japanese will do differently now that peace is restored. The Japanese will doubtless go very far in the absolute government of Korea, and the Emperor of Korea seems likely to become simply a figurehead.



Combination Car, Seoul Electric Railway.

To one who had just come to Korea from the Philippines, the contrast was very noticeable. In Manila everything reminds one that the Philippine islands are run for the Filipinos, and foreigners and Americans are rather curtly given to understand, if not in so many words, at any rate, by the general attitude of our government, that if they are not satisfied with the policy of concessions to the natives at the expense of the foreigner, they had better get out. No such air of paternal government for the natives pervades Korea, and one is constantly reminded that Korea exists for the benefit and profit of the Japanese.

On the steam railroads in Korea, which are all controlled by the Japanese, no Koreans are employed for any positions whatever, except common laborers, because Japanese laborers are not obtainable in the country. Whenever Japanese laborers are available they are also employed, but there are few to be had. All foremen of gangs, trainmen, station agents and employees, even car cleaners on the railroads, are Japanese. Also all locomotive engineers, firemen and machinists.

Telegraph employees, as stated before, are all Japanese, as well as the post-office force, which was entirely made up of Japanese employees, the majority of which could not speak the language of the country. "Carpetbag" rule seemed to be in force with a vengeance in Korea.

The public debt of Korea was said to be only about 7,000,000 yen, Japanese money, which was recently floated by the Japanese in Japan for the purpose of issuing a new system of Korean currency and based on the gold standard of Japan. This was badly needed, for the Korean currency was in a deplorable muddle. The government revenue from all sources was said to be about $4,000,000 per year.

The commerce of the country amounted, roughly, to the following chief items: Fishing industry produced about $1,750,000, agriculture about $75,000,000, and minerals about $2,000,000. The imports were about $9,000,000, and the exports about $5,000,000, not including extraordinary imports on account of war.

The banking of the country is also fast passing into the hands and control of the Japanese. There are no Korean banks. Branches representing the principal Japanese banking houses practically control the banking business now, and are established in Seoul, Fusan and Chemulpo. A private banking business is established in Seoul by Messrs. Collbran & Bostwick, an American firm, and the principal English banks of the Orient have correspondents in Chemulpo. General business is steady, and shows a healthy increase, but the resources of the country are entirely undeveloped.

The mining industry of the country was first successfully exploited by an American company, which operates at the present time very profitable gold mines in the interior. Gold, copper and coal are the chief minerals known to exist at present. Various concessions for mining and prospecting were granted by the Korean government before the war to American, German, English and Japanese people. These are all being prospected at the present time preparatory to being developed and systematically worked if the prospects are encouraging. It is very doubtful if any more mining licenses will be granted to any one but Japanese companies in the future.

A franchise was also granted before the war to Messrs. Collibran & Bostwick for a system of water works to supply the city of Seoul with good wholesome water, and while no actual construction has been started it is understood that arrangements are being completed to carry into effect this project.

The transportation facilities of the country consist of several railroads of standard gage (4 ft. 8½ in.). One of the rivers, the Chemulpo, is navigable to Seoul, and one or two others for a short distance only. In Seoul there is an electric street railway. The country is also fairly well provided with roads and trails, but few carts or wagons are used. The bulk of transportation is still carried on by means of pack animals, small horses and cattle, which carry 150 lbs. of cargo on their backs, and by means of the natives themselves, who carry as much as 70 to 100 lbs. of freight in a frame strapped to their own backs. In Seoul there are a considerable number of "rickshaws," or man carriages in use, which is an innovation brought over from Japan.

The railroads, which exist at the present time, are the following:

Chemulpo to Seoul, 26 miles, completed.
Seoul to Fusan, 265 miles, completed.
Seoul to Wiju, 250 miles in operation and partially completed.
Seoul to Gensang, 125 miles, building.

The first railroad built in Korea was the line from Chemulpo to Seoul, 26 miles, the franchise for which was originally granted to a Mr. Townsend, of Chemulpo, an old and successful American merchant, who was associated with Mr. Morse, of the American Trading Company, in this venture. The line was constructed by an American company, Messrs. Collbran & Bostwick, of Seoul, and was opened to traffic and operated by them for some time, when it was finally sold to the Japanese at a handsome profit, it is said. It was no doubt bought for political influence, and to keep it from falling into the hands of the Russians.

Type of Wooden Trestle Over Stream.

This line does chiefly a passenger business between Chemulpo,

the principal seaport, and Seoul, the capital of Korea, and in the freight-carrying traffic meets with water competition of the Chemulpo river for eight months of the year.

The river is frozen, however, from November to March, and ice interferes with the water transportation. The line is substantially built with a good, solid road-bed, and good station buildings, but is frequently damaged by floods from the Chemulpo river. The grades are light, but the curvature is a considerable handicap to speed and economic operation. Trains make about 20 miles an hour.

The Fusan line, 265 miles, is the best and most difficult piece of railroad work in the country. It was built under a franchise granted to a Japanese company, and the money probably was advanced by the Japanese government. The line was located and constructed entirely by Japanese engineers. The grades and curvature are heavy, and the work entailed a large amount of rock excavation and many tunnels through rock. Bridge work was also heavy, and it is probable the line cost $35,000 per mile or possibly more. The bridge masonry and retaining walls and culverts along the line are built either of concrete or of rubble masonry made of good hammer dressed stone. The bridges and rails are of American made steel.

Heavy floods occurred in September of last year, and carried away several of the largest bridges, doing much damage to the line in other respects also, so that it required two days to make the trip to Fusan when the writer passed over this line.

The bridge piers were built with too light a cross section to withstand the heavy floods, and when the water reached the steel superstructure, instead of carrying the bridge off the piers as might have been expected, the piers themselves broke off, a clean fracture of the masonry, about 8 ft. below the bed plates of the spans, carrying away the whole of the superstructure.

The water had entirely subsided by September 20, 1904, and the Japanese engineers had erected ferries and pontoon bridges for temporary traffic of passengers and baggage, and it was necessary to change cars several times on the trip. The railroad engineers and workmen were busy getting the steel work of the bridges lifted out of the water, and were already engaged in the re-erection of the bridges.

Temple and Trolley.

View of Main Street, Seoul.

A matter which caused great surprise was the crude and antiquated methods used in all construction works by the Japanese in Korea. As the war was just over and the writer had read so much about the up-to-date methods of the Japanese government and army, it was naturally expected that they would use modern appliances in railroad construction and other engineering works in Korea. Nothing of the sort was visible anywhere. Bridges were being lifted and erected without a single hoisting engine or steam-operated derrick. Piles were being driven with hand-operated pile drivers. Concrete was mixed and placed by means of shovels only, and without any mechanical concrete mixers; earth and rock were excavated entirely by hand and transported in bags, baskets and on a sort of hand platform carried by two men. No wheelbarrows were in use, and no steam shovels or other mechanical devices. Coolies carried earth from a barrow pit up a ten-foot embankment by hand, about half a cubic foot at a time, and placed it in the bank.

In Chemulpo the Japanese were carrying out harbor improvements without dredges. The manner employed was to lay a portable track on the mud flats at low tide, after which iron dump cars were placed on the track. A stone dike was built by hand and the material for the fill was excavated by hand at low tide by Japanese coolies where it was desired to deepen the harbor and the material was transported to the dike in dump cars and placed in the fill by hand behind the dikes. When the tide began to rise it was, of course, necessary to stop work, and the track and cars were inundated until the next low tide.

Japanese naval officers had been working for many months raising the Russian cruiser "Variag," which they sunk at Chemulpo at the beginning of the war. It was afloat and being repaired sufficiently to be towed to Nagasaki when the writer was at Chemulpo. This work must have cost more than the cruiser was worth, and doubtless would never have been undertaken had the Japanese known what a number of Russian ships they were going to secure for their navy later on.

But, returning to the Japanese railroads, the Fusan line is well built and ballasted with gravel and broken stone, and is altogether

Plenty of Room in the Front of the Car!

Korean Soldiers Awaiting Miss Roosevelt.

a creditable piece of work, barring the mistakes in the weight of the bridge piers.

The line from Seoul to Wiju, on the Manchurian border, was originally a franchise granted to a French company, and surveys had been made and construction begun under the direction of the French engineers when it was acquired also by the Japanese, and was built very hurriedly after the war began. It is roughly built, more in the nature of a provisional military line than the other two roads described. This line is being rebuilt, however, and will be extended to connect with Port Arthur and the Manchurian-Russian line some place near Kerin, or south of Harbin. This is all provided for in the new Japanese-Chinese treaty, which has just been published. It is a strategic line built for political and military purposes, and while it is expected to develop the resources of the country it serves, and especially to develop the large forests of the Manchurian-Korean frontier, which was one of the sore contentions which caused the war, still it will probably not pay operating expenses for some years to come; but it is safe to say that the Korean people will be made to stand this burden instead of the Japanese, on the ground that the line is for the protection of the Korean empire.

Ticket Office and Station.

I had no opportunity to see any part of the new Gensang line, which will cross the peninsula from Seoul to Gensang on the northeast coast of Korea, and provide communication with the east coast, and at the same time open up a good and wholly undeveloped country. It was understood that this line has been surveyed and construction work had been started several months ago, but all these Korean projects require a large amount of money, and must, of necessity, proceed slowly, as the Japanese have not the funds at the present time to carry out extensive works in the development of Korea, and they will only accept foreign money in so far as they can control that money and the properties developed themselves. It is pretty safe to predict that the day when railroad franchises, mining licenses and the control of any public utility can be acquired by foreigners in Manchuria and Korea is past. The Japanese will buy foreign goods, railroad materials, rolling stock and machinery for the development of these new possessions, and borrow foreign capital to pay for the proposed works, but at the same time they will keep a firm hand on all franchises and control of the industries of these countries; and there is no doubt that the Japanese hope and expect within the next twenty years to develop their own resources and industrial institutions to the point where they can also manufacture and supply all of the goods and materials, machinery, etc., which will be required for the Manchurian and Korean trade.

The Korean railroads are at present equipped with good American locomotives of standard design and build, and with rolling stock built mostly by the American Car & Foundry Company. The passenger cars are neat and comfortable, even if they are not elaborate or gorgeously fitted. The freight cars are entirely fitted for the traffic.

Lines in Operation at Turnout.

Passenger traffic is divided into three classes—first, second and third. The first and second class passengers occupy the same cars, which are merely separated by a wooden partition in the center of the car. The difference is simply in the finishing of the interior fittings of the cars, the first class compartment being a little more elegantly finished and furnished than the second class. The third class cars are very plainly finished, with no upholstery and plainly painted inside.

The passenger fares are very cheap, being about three cents a mile for first class, two cents for second class and one cent for third class. The great bulk of the traffic is passenger traffic, which forms probably 70 per cent. of the business done by the railroads. Third class passenger traffic predominates, and forms probably 90 per cent. of the entire passenger business. The first and second class cars are never full, and can scarcely pay the railroads for hauling them.

Freight rates are reasonable, and sometimes very low. For instance, on the Chemulpo-Seoul line, where there is water competition, the railroad has at times carried coal as cheaply as 50 cents a ton, and other merchandise in proportion.

There is ample and excellent steamer communication and connections between the railroad terminal points of Chemulpo and Fusan and the ports of Japan. Steamship service is very frequent, and passage most reasonable. There is a fine new steamship service between Fusan and Shimonisaki, so that passengers can leave Seoul in the morning at 7 o'clock, arrive in Fusan at 8 o'clock in the evening, go right aboard the steamer and arrive at Shimonisaki or Moji early the next morning, or just 24 hours from the capitol of Korea to Japan, where passengers can take train for Tokio, Yokohama or any part of Japan.

With the exception of the gold mines mentioned above, the only purely American enterprise of importance at present in Korea is the American-Korean Electric Co., which owns and operates the Seoul electric trolley lines and the electric light plant.

This was a concession granted to Messrs. Collbran & Bostwick, associated with certain Korean gentlemen, of which the Emperor himself was probably one. The franchise was an exclusive one for 35 years, and may be renewed on terms to be arranged by the parties. On the completion of the line it was to be taken over from the builders by the Korean company and paid for. Probably because it was built to sell, and also because of limited capital, it was laid with 25-lb. rails and with narrow gage track, and generally gives one the impression that it was built to sell.

Upon completion the company found difficulty about securing the necessary funds to pay for the line, and it remained in the hands of the builders who operated the line. Finally, it was reorganized as the American-Korean Electric Co., of which one-half of the stock is owned by the Emperor of Korea and one-half by Messrs. Collbran & Bostwick. The company is incorporated under the laws of Connecticut.

The line was opened in 1899, and was almost immediately stopped by the natives, who forcibly tore up parts of the track, burned cars and caused considerable loss to the company. There was an unusual and long drouth in the country. They said that the power house rested on the "Rain Dragon's" back, and their crops were being destroyed because he could not do his work. Two days after the riot the long-delayed rains came, and upon resuming operations six months later American motormen and conductors were employed in place of the Japanese, who had previously been employed. The superstitions were gradually dispelled, and have finally been entirely removed.

The American motormen and conductors at $100 per month added greatly to the expense of the operation, and the line was operated at a loss. Their contracts were canceled in 1903, and the Koreans who have been employed in their places give good satisfaction and receive $10 per month. The railway is now in the sixth year of its existence, and the earnings have steadily increased since 1903. Its advantages are now recognized by the people, all prejudice having been overcome, and its prosperity is increasing rapidly.

The electric light service was inaugurated by this company in 1901 in Seoul. The demand for electric light continues, and is in excess of the capacity of the plant. The trolley lines have a present mileage of 10.7 miles of street railway. The company aims to run a five-minute service on the principal part of the line. The gage of the track is 3 ft. 6 in.

It is now proposed to rebuild the power plant and increase the capacity greatly. Also to practically rebuild the whole line and extend same by the addition of five miles of new suburban line, as it has been amply demonstrated that the line will have a permanent and increasing traffic. For this purpose, bonds have recently been negotiated in London, which was the object of my visit to Korea. The improvements are under the supervision of Messrs. J. G. White & Co., of New York, who are the consulting engineers to the underwriters of the new bond issue.

The concession carries no obligations as to track level, maintenance of way, paving or regulation of fares, these matters being left entirely in the hands of the company. The company appears to have the right to extend its lines to any part of the city using any public street, and also has the exclusive right of public lighting. It has no fixed contracts with the city for street lighting, although light is supplied for that purpose at agreed rates.

The line is divided into zones, and ticket offices are established at various points along the line where passengers are required to purchase tickets before entering the cars, as fares are not collected on the cars by the conductors. The fare is about 2½ cents per zone, in our money, and the line is divided into four zones, at the rate of about one cent per mile.

The plant is about as follows:

Boilers are of the Babcock & Wilcox type, and engines of MacIntosh & Seymour make.

The electric equipment is made by the General Electric Co. and the Westinghouse Co.

The cars were built in Japan out of Japanese wood, with trucks and iron work by the J. G. Brill Co. The road-bed is simply the public street laid with T-rails at any level, and not ballasted except with sand, which is obtainable everywhere from the coarse disintegrated granite formation of the ground. There are no local regulations regarding street traffic.

Bridges are of the wooden trestle type, and built of Oregon fir. Poles are also of pine and may be erected of any size or height the company may desire. The track is single, with numerous turnouts for car crossings. The buildings and power house are usually of good, substantial construction, being built of bricks and granite. The car barns are of wood.

The company pays no taxes of any kind, not even customs duties on imports, and there is no land nor property tax in Korea.

The city of Seoul lies in a valley of slightly rolling hills surrounded by mountains. The population is estimated to be about 300,000, of which 200,000 live in the city proper and 100,000 more in various outlying suburbs, all of which will be served by the street railway. It is a large city, built with fairly substantial houses. The street traffic is very dense, and streets fairly swarm with people.

The people do not patronize the street cars and steam railroads at present to the extent that usually prevails, owing to two principal causes, mainly because of their limited means, and partly on account of the poor service afforded, as it has long ago been demonstrated that even a semi-savage appreciates the difference between a good and bad service.

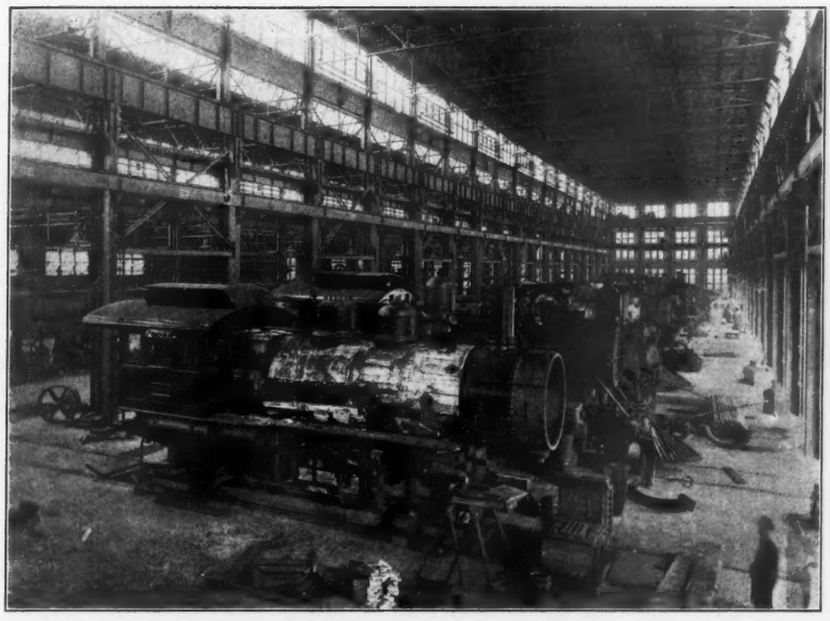
As the earning power of the people increases, as it will do under Japanese direction of affairs, the people will undoubtedly patronize the railroads and street car lines much more than they do at present.

The sensible and logical thing to do with this plant is to consolidate with the Chemulpo & Seoul railway, 26 miles long, and operate the present street railways and light in Seoul, the steam railroad to Chemulpo with its heavy passenger traffic, and the Chemulpo electric light plant under one management, and supply the power for operation from one plant.

The Electrical Equipment of the South Louisville Shops of the Louisville & Nashville.

The electrical equipment of the South Louisville shops of the Louisville & Nashville has been carried out with the same care and thoroughness as was the general layout and other details of the plant which were fully described in the *Railroad Gazette* of June 9, 1905. As was then shown, in the general plan, the shop buildings are grouped around a transfer table having a bridge 100 ft long and a transverse travel of 1,050 ft. The bridge is operated by a railway motor capable of driving it at a speed of 12 miles per hour. By means of sliding clutches the motor may be disconnected from the bridge drive and connected to a drum to pull coaches and locomotives onto and off of the bridge. Along the north side of the transfer table lies the largest building of the group, having a length of 1,000 ft., and including under one roof the boiler shop, the general machine shop, and the erecting shop. The south bay of this building is divided into 40 sections and every section has a track connecting with the transfer table. Eleven of these sections are in the boiler shop which is separated from the erecting shop by a brick wall 12 ft. high. A general view of the erecting shop is given herewith. The distribution of light in this building is excellent as will be noticed. The erecting floor is served by a 100-ton electric traveling crane provided with two trolleys and capable of carrying the largest sized locomotives from any part of the erecting shop over the wall into the boiler shop. A 10-ton crane on a lower runway serves to carry small parts. The traveling cranes, of which there are 11, are all of the Niles Company's make.

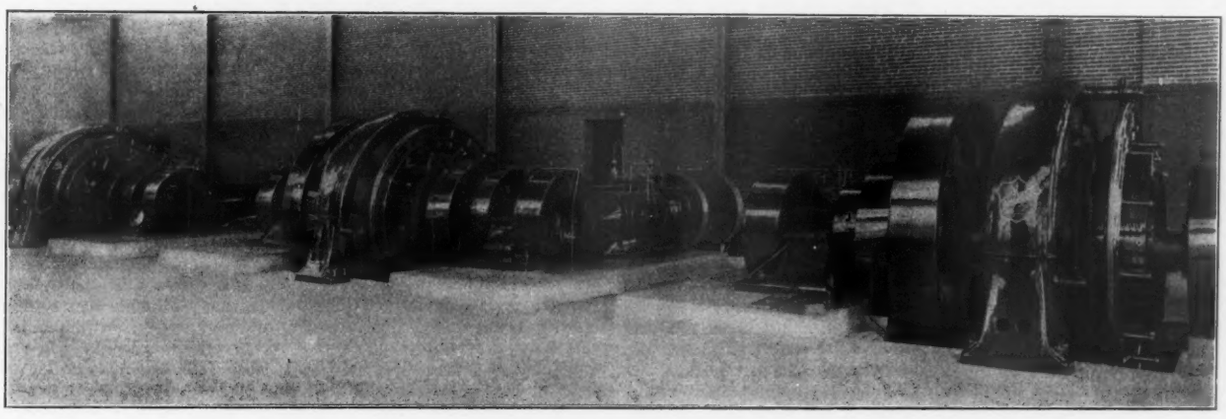
The most interesting applications of electric drive are found in the machine shop. Near the middle of the shop is a switchboard controlling the various local feeders and connecting them to the mains running to the power house. Near the switchboard is located a Bullock three-wire multiple-voltage balancer which is shown in the accompanying illustration. This divides the 240 volts supplied by the mains into 100 and 140-volt circuits. A third wire, in addition to the generator mains, serves to supply three different voltages, viz., 100, 140 and 240 volts, to the motors driving machine tools, which it is desired to operate at variable speeds. These different voltages are applied successively to the motor armatures by means of Bullock type "Y" controllers and intermediate speeds, and speeds above the normal at 240 volts, are obtained by the use of shunt field resistance. A 90-in. Niles driving-wheel lathe is driven by a Bullock type "N" motor operating on the three-wire system. Other special tools are a Bement-Niles three-head frame slotter and an American three-column radial drill. These tools are driven by Bullock variable speed motors as are also a number of heavy lathes and other tools of various kinds. The motors driv-



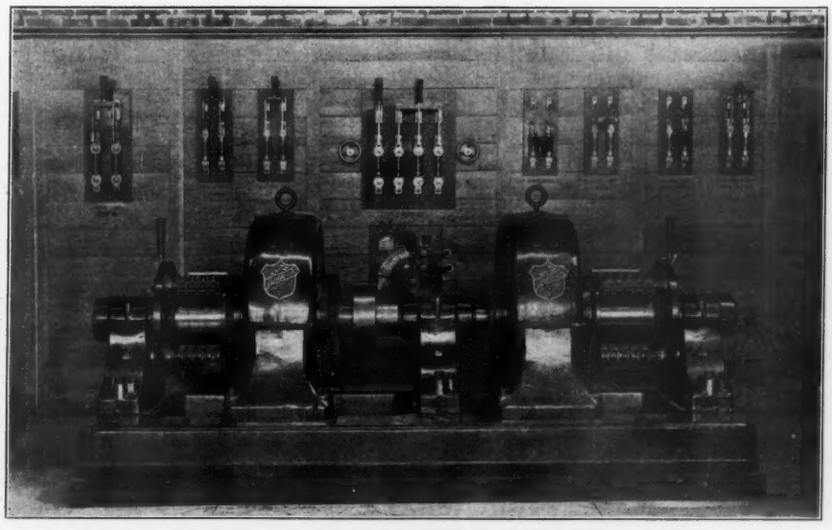
General View of Erecting Shop—South Louisville Shops of the Louisville & Nashville.

ing these large tools are rigidly connected to the machines and the power is transmitted through gears. Such tools as are operated at constant speed are belted to a line shaft which is driven by a belted motor. In the boiler shop the large punches and shears are driven by individual motors which are belted to the tools. Compound wound motors are used, and the usual arrangement is to place the motors close to the machines on foundations built a few inches above the floor. The slipping of the belt in starting, due to the unusually large inertia of this class of tools, allows the motor to start with much less current than would be required if the motors were geared, and the compounding of the fields has the same effect, as it increases the torque of the motor.

To the north of the machine shop lie the forge shop and the wheel shop. In the forge shop, motors are used where possible, but, as nothing has been found thus far to displace steam hammers, the number of motors is not very large. In the wheel shop, the machine tools are all of a constant speed type and are belted to countershafting driven by a Bullock 60 h.p. type "H" motor. To the north of the wheel shop lies the foundry, and electricity is used for all purposes to which it is applicable. The drop for breaking the scrap, the blowers for the cupolas, and the ventilating fans as well



Interior of Power House; Louisville & Nashville Shops, Showing Three 350-K.W. Allis-Chalmers "Bullock" Type "I" Generators Direct Connected to Cross-Compound Engines.



Allis-Chalmers "Bullock" Three-Wire Multiple-Voltage Balancer with Switchboard for Controlling Local Feeders. South Louisville Shops of the Louisville & Nashville.

as the cranes, are all motor driven. The distance from the power house to the foundry is so great that no other method of transmission could be considered. Placed along the east side of the foundry is a runway supporting a traveling crane, and this runway passes along the side of the wheel shop, the end of the machine shop, and extends as far as the transfer table. The crane bridge is 40 ft. long, thus giving excellent yard service to the various shops and affording a very satisfactory method of transporting material from one department to another. In the wood shop the tools are operated at constant speed and most of them are driven by belts from line shafts which are motor driven.

The power house is located at the south of the group of buildings where the handling of fuel and ashes can be done most conveniently. The equipment includes three 350-k.w., 250-volt, type "I" Bullock generators direct connected to cross-compound Buckeye engines running at 175 r.p.m. Steam at 125 lbs. pressure is supplied by a battery of Stirling boilers provided with mechanical stokers. The coal elevator is motor driven. In addition to the generators, the engine room contains a cross-compound two-stage air compressor and a 12-in. x 18-

in. x 24-in. fire pump. The switchboard, built by the Western Electric Co., is equipped with Weston flush type. All the piping between the engines and the boilers is carried under the floor. This gives a neat appearance to the engine room, as is shown in the illustration.

The perfection of detail which go to make the shops one of the notable railroad shop plants of the country is largely due to the careful personal supervision of T. H. Curtis, Superintendent of Machinery, who began the work while Mechanical Engineer of the road.

Senator Foraker's Speech.

The speech made by Senator Foraker before the United States Senate in opposition to the Hepburn Bill constitutes perhaps the best argument which has yet been presented on this side of the case. Senator Foraker commenced by saying that the proposed rate legislation was so contrary to the spirit of our institutions and of such drastic and revolutionary character that if not in its immediate effect, at least as a precedent, the consequences are likely to be most unusual and far reaching. He then gave at considerable length a history of railroad development in the United States which it is not necessary to reproduce in these columns. The abstracts that follow show the main line of his argument.

It is not to be wondered at that the upbuilding of such great interests should have been attended with many abuses and evil practices. It would be strange if it had not been. Rather the wonder is that these abuses and evil practices have not been greater than they have been. It would be strange, indeed, if there were not now, notwithstanding the improvements in the railroad situation, evil practices and abuses still remaining for which a remedy should be provided.

These evils are, generally speaking, of three classes—excessive rates, rebates and discriminations. Of these, excessive rates are the least serious.

Nevertheless there should be some prompt and effective remedy provided by the law against excessive rates to whatever extent they may be indulged in and wherever they may be found.

A more serious class of evils, because more prejudicial in their consequences and results, are rebates. They are granted under many forms and guises, and include not only money payments, but all kinds of discriminations between shippers, such as undue allowances for terminal charges, elevator charges, refrigerator charges, icing charges, and private cars, false weights, improper classification, under billing and many others too numerous to mention. The practice of giving rebates was a result of sharp competition between roads for business. At one time almost, if not quite, every road in the country indulged in the practice. The strongest and most prosperous railroads, although, like the others, granting these rebates, were always, as a rule, anxious to put a stop to the practice. In that behalf many traffic agreements and arrangements, of one kind and another, were entered into, including many others that were known as pooling arrangements. All these arrangements and agreements proved ineffectual to a greater or less extent. The pooling arrangements were more nearly observed than any others, but they were unfortunately named, and because they prevented, in some measure at least, free and active competition they were always unpopular. In consequence they were prohibited by the interstate commerce act of 1887. Subsequent to that statute traffic agreements and arrangements were chiefly relied upon. They were in effect simply agreements between competing roads as to what were regarded as reasonable schedules of rates, coupled with the further agreement to maintain the same.

But the Supreme Court of the United States in what is known as the Trans-Missouri case, and the Joint Traffic case, held that these traffic arrangements were in violation of the Sherman anti-trust law, which, until that litigation was commenced, was not generally understood to apply to railroads; they being fully regulated, as it was thought, by the Interstate Commerce Act. The prohibition against pooling and the invalidity, as established by these decisions, of traffic agreements and arrangements left the roads without any adequate remedy against the practice of rebates, which each road felt compelled, in justice to itself, to indulge in because its competitor did; the weak roads to get business, the strong roads to hold it. Very largely on this account the tremendous consolidations of railroad properties resulted which have occurred during the last five or six years. The effect of these consolidations upon rebates and discriminations as to persons and places was no doubt to restrict them somewhat, but the practices continued to such an extent, and with such consequent dissatisfaction on the part of shippers and railroads alike, that the Congress, to provide an efficient remedy against them enacted, February 19, 1903, what is known as the Elkins law.

The Elkins law has proven a most efficient measure for good, and since its passage the practice of giving rebates and allowing discriminations among shippers has been largely discontinued.

HEPBURN BILL.

This bill increases the powers of the Commission in many respects, but I shall call attention to only its most important provisions of this character.

It makes the order of the Commission condemning a rate effective and thereby disposes of that rate, and then authorizes the Commission to name a new rate and put it into operation in place of the condemned rate.

It authorizes the Commission to compel disagreeing railroads that have nothing in common except a physical connection to operate jointly as through routes on such rates and terms as it may impose.

It dispenses with jury trials in an important class of actions to recover money by providing a procedure that makes such trials impossible.

It imposes such extreme, unreasonable and burdensome penalties as to probably invalidate the measure in that respect. It does not provide for a proper review by the courts of the orders of the Commission, but seeks to exclude the same.

There are other provisions that merit attention, but these raise all the questions I care to discuss at this time.

There is a common agreement that, although the railroad situation is vastly improved as compared with what it was only a few years ago, there are still, as there probably always will be, many evils to remedy, and to that end there should be some kind of appropriate legislation.

The principal difference of opinion is as to whether to accomplish this common purpose the legislation to be enacted should be of an amendatory character, such as to work out these remedies in the courts, where ordinary controversies are settled, or should be such as to confer the rate-making power to be exercised in the way provided by this bill on the Interstate Commerce Commission.

I believe in the court plan, as contradistinguished from the rate-making plan, not alone because it is, as I shall endeavor to show, much simpler, much more expeditious, much more efficient, and without expense to the shipper, but because, in addition to all that, it avoids all legal and constitutional questions, while the rate-making plan as set forth in this bill encounters a number of such questions that are of the most serious character, and some of them, in my judgment, fatal.

In the first place, there arises at the very beginning of this controversy a most serious question as to the power of Congress to fix rates at all.

I know it has been assumed throughout all this discussion, as it has been in framing this bill, that we have that power and that it is unquestioned, and I know that there are many expressions to be found in the opinions of the Supreme Court of the United States that indicate a similar assumption on the part of that court, but nevertheless, the fact remains that the court has never yet passed on that question, and there are many eminent lawyers who are of the opinion that the court will hold, when it does decide that question, that Congress does not have that power.

Their reasoning seems to me to be sound, and the effect of it absolutely fatal to this entire scheme of legislation.

I am confirmed in this opinion by what the Supreme Court said in the Northern Securities case where, after discussing the nature of the combination there under consideration and the evil consequences thereof, Mr. Justice Harlan, speaking for the court, said:

> Will it be said that Congress can meet such emergencies by prescribing the rates by which interstate carriers shall be governed in the transportation of freight and passengers? If Congress has the power to fix such rates—and upon that question we express no opinion—it does not choose to exercise its power in that way or to that extent.

This statement, apparently not necessary to the disposition of that case, is, at least, an announcement to the legal profession that the question of the power of Congress to fix rates in the exercise of its power to regulate commerce is an open one, upon which the court will hear argument whenever that question may be presented. If it be an open question for the Supreme Court, so, too, is it an open question for the Senate, and no mere assumption should be allowed to dispose of it. We cannot dispose of it by ignoring it. It must be argued in the courts, and I shall, therefore, discuss it now, at the beginning, where it properly belongs.

Congress has no power with respect to interstate commerce except that which is conferred by the commerce clause of the Constitution "to regulate commerce with foreign nations, and among the several States, and with the Indian tribes," and to enact all legislation necessary to give effect to this power.

The controlling questions arising upon the construction of this clause are, first, what is "commerce," and, second, what is included in the power "to regulate?"

It is an elementary proposition that the law, whether statutory or constitutional, is what the framers of it intended it should be, if that intention can be ascertained and be not in conflict with the

language employed, and that it never is what, in the nature of things, it could not have been intended to be.

What, then, was the intent of the framers of the Constitution when they put the commerce clause into that instrument?

I shall not stop to gather this intent from the debates of the convention, from contemporaneous history, or from the restrictions imposed by the Constitution upon the exercise of this power, all of which show that rate making was not within the mind of the framers of the Constitution, but shall confine myself to adjudicated cases and recognized rules of construction.

These authorities (quoting a number of Supreme Court decisions) and others that might be cited establish the proposition that the power conferred upon the Congress as to interstate commerce is precisely the same as the power conferred upon Congress as to foreign commerce; neither more nor less.

This power, being identical in both cases, can not include the power to fix rates to be charged for transportation in the one unless also in the other. During the whole period of our country's existence no one down to this moment has ever claimed, or even suggested, either at the bar or on the bench, that it was the intention of the framers of the Constitution to confer on Congress by the commerce clause power to fix rates of compensation for the carriage of passengers or freight in foreign commerce. This is not alone, because the fixing of the carrier's compensation is not an article of commerce to be transported, not an element in the conduct of commerce that affects one way or another the question of safety or convenience in transportation of either life or property, but also because, aside from all questions about treaties and international relations generally, it would be utterly impracticable to exercise such a power with respect to international commerce. To-day but little of it is carried in ships of American registry. Less was carried when the Constitution was framed. Then as now the great bulk of international commerce was carried in ships and transports over which we could not have, if we so desired, any control whatever, except only while the same might be in our ports or within our jurisdiction. Whatever we might be able to do as to American ships we could not fix rates for foreign ships. The mere suggestion of the situation as to foreign commerce, how it is carried on, and the impossibility of intelligent action in prescribing rates of charges is enough to show that such an exercise of power was not and could not have been contemplated by the framers of the Constitution when they conferred on Congress the power to regulate foreign commerce.

But if this power was not conferred as to foreign commerce neither was it as to interstate commerce.

The advocates of rate-making legislation cite decisions of the Supreme Court to the effect that the power to regulate commerce conferred upon Congress by the commerce clause is a complete plenary power. This is true, but the complete power spoken of by the court is the power to regulate. The question remains whether or not within this complete power to regulate is included the power to fix rates of compensation for a carrier to charge for the service he is to render; and for the reason that it is not necessary to the execution of the power "to regulate," which goes properly no further than may be necessary to insure comfort, safety, and uniformity of regulations in the transportation of passengers and property, and because, in the nature of things, such a power can not be exercised and never could be exercised with respect to foreign commerce, it never could have been the intention of the framers of the Constitution that any such power should be conferred.

This does not leave us at the mercy of the carriers.

In other words, if it be held that the Congress has no power to fix rates, it does not follow that there is no power in the Government to control charges to be made for the transportation of interstate commerce.

It does not so follow, because all carriers of interstate commerce, like all other public utilities, are required, in the absence of any statutory provision, simply because of the common-law rule, to charge only reasonable and just rates, and to abstain from the practice of unreasonable discriminations between individual shippers and between independent localities. This rule of the common law has been universally recognized in this country, and has always been enforced in courts of equity when their jurisdiction in such cases has been invoked. If, therefore, there were no legislation on the subject, any shipper who might be charged an excessive rate could either pay and recover back in an action at law, in a law court of proper jurisdiction, or, to avoid a multiplicity of suits, he could exhibit his bill of complaint in a court of equity and secure relief by injunction. These propositions are elementary and do not need a citation of authorities for their support, but the books are full of cases in point.

The framers of the Constitution did not, therefore, when they conferred on Congress the power to regulate interstate commerce without coupling with it the power to fix rates, leave shippers and travelers at the mercy of the carriers as to rates of charges, discriminations, or other wrongful practices, but, on the contrary, provided for them complete remedies in the system of courts for which they made provision.

But if it should be that I am mistaken in claiming that the power to fix rates is not comprehended within the power to regulate interstate commerce, and it be assumed that Congress has the power to fix the compensation of a carrier for the transportation he sells, then the further question arises, how shall Congress exercise that power?

Manifestly it is utterly impossible for Congress by statute to fix all the rates for interstate commerce. It must resort to some plan under which it can avail itself of the help of some kind of board, commission, tribunal or agency. But when it undertakes to do this it must take heed lest it undertake to do it in such a way as to delegate legislative authority and thus make its effort unconstitutional and unavailing, for it will be conceded that it is unconstitutional for Congress to delegate legislative power.

The chief provisions of the Hepburn bill is that if after hearing a complaint the Commission—

> be of opinion that any rates are unjust or unreasonable, or unjustly discriminatory, or unduly preferential or prejudicial,

it shall have power—

> to determine and prescribe what will, in its judgment, be the just and reasonable and fairly remunerative rate or rates. . . . to be thereafter observed in such case as the maximum to be charged; . . . and to make an order that the carrier shall cease and desist from such violation . . . and shall not thereafter publish, demand or collect any rate . . . in excess of the maximum rate . . . so' prescribed. Such order shall go into effect thirty days after notice to the carrier.

The first question raised by this provision is whether or not all three of the powers of government, legislative, judicial and executive, can be centered and commingled in a political board, claimed to be administrative in its character.

This proposed legislation is radically different in this respect from the interstate-commerce act. By that act the Interstate Commerce Commission was empowered to hear complaints as to unreasonable rates, and if upon such hearing it concluded that the rates challenged were unreasonable, it could condemn them and order the railroad to desist from further charging the same; but the Commission had no power to enforce this order, and if the railroad refused to comply with it the only remedy was for the Commission to sue the road in court upon the order, to secure there, by judicial decree, its enforcement.

The hearing of the complaint and the making of a finding and order with respect to a rate were to that extent in the nature of a judicial procedure, but it was not judicial in fact, because the Commission had no authority or power to give effect to its order when it made one. The net result of what it was authorized to do was, to employ the language used in the Minnesota statute already quoted, to make a recommendation, for that is all its action amounted to. If the road did not see fit to accept the conclusion of the Commission, resort must be had to the courts, where alone judicial power could be exercised.

I mention this with particularity to show that the very able lawyers who, as members of the House of Representatives and the Senate, framed the interstate-commerce act of 1887, carefully avoided conferring on the Interstate Commerce Commission any kind of power except only executive power, for they stopped short of giving it judicial power by refusing to it authority and power to execute its orders and decrees, and they carefully refrained, as the Supreme Court held, from conferring upon it the legislative power of making a new rate to be substituted for a condemned rate. They gave only the one kind of power, because they were familiar with the rule, and by their action showed their respect for it, that two kinds of power, much less three kinds of power, could not be conferred on what they clearly intended should be in legal effect, as well as in practice, only a purely executive or administrative board. This Hepburn bill, however, gives to the Commission the additional power of executing its judgment of condemnation of a rate, which makes the power purely judicial, and then in addition gives to the Commission the power to substitute a new rate for the one it has condemned and put out of existence, which is a purely legislative act.

In addition to these two new powers, judicial and legislative, never heretofore by any act conferred on the Interstate Commerce Commission, it is allowed by this Hepburn bill to retain all the executive power with which it was originally invested, with much more power of that character added.

That the bill is unconstitional, because of this commingling of all these powers, appears beyond question.

(Senator Foraker here quotes a large number of cases to show that the delegation of legislative power to a commission is unconstitutional, and says—)

The essence of all these decisions is given in the case of Field *v.* Clark, page 693, where, as stating the true rule, they quote Judge Ranney, as the Wisconsin cases did, as follows:

> The true distinction is between the delegation of power to make the law, which necessarily involves a discretion as to what it shall be, and conferring authority or discretion as to its execution, to be exercised under and in pursuance of the law. The first can not be done; to the latter no valid objection can be made.

I repeat this quotation to emphasize it.

This rule indicates the distinction running through all the well-considered cases on the subject of the delegation of legislative power. According to this rule the test is whether or not the party on whom the authority is conferred is intrusted with any discretion to make the law; if so, the statute is unconstitutional. If, on the other hand, no discretion be conferred, but only an administrative duty be enjoined, the statute is valid. Discretion may be allowed as to its execution, but none as to what the law shall be.

When it is remembered that the States, except only as to the powers by them delegated, are complete sovereignties, and when it is remembered that they have complete sovereign power as to rates and railroads within their borders, there cannot be any question of the right of the State, acting through its legislature, when all legislative power is conferred upon the legislature, or acting through commissions, where the constitution provides for the creation of a commission and for the exercise by it of legislative power, as in the States of Mississippi, Texas, Louisiana, Virginia, and other States, to make rates, and to prescribe regulations, and to do, generally speaking, all the things they have been authorized in such States to do; but the case is wholly different as to the Federal Government, which has no power, except that which is delegated and such as is necessary to be exercised to give effect to that which is delegated.

The Constitution of the United States expressly provides that all legislative power shall be vested in Congress, and it further provides that the Congress shall have power to regulate interstate commerce. There is here no division of legislative power, nor is there any authority to the Congress to delegate to any commission, board, or tribunal, or agency, any part of its legislative power. The legislative power conferred upon Congress can not, therefore, be exercised by any authority except only the Congress itself, and the only question remaining is whether or not the conferring of the power to make rates upon a commission or tribunal is a delegation of that power, and that question must be determined by the terms of the statute conferring the power. If Congress has the power to fix rates, a commission can be created and it can be utilized in the fixing of rates. But it can be utilized only under some such statute as those enacted by the legislatures of Iowa and Wisconsin, when, in 1873 and 1874, they passed their respective statutes, classifying the railroads according to earnings, and providing that the officials chosen to execute them should, by computation, taking the classification as a basis, determine what statutory rate should apply. That was administrative.

The Congress could also utilize the Commission in the fixing of rates if it should see fit to resort to the policy of a mileage basis. But for the Congress to simply declare what is already the law, for it is only declaratory of the rule at common law, that rates shall be reasonable and just, and then create a commission and empower that commission to say what in its judgment a rate shall be, is, most clearly, to confer legislative power, because the rate to be fixed is the law to be enacted, and that is to be determined by the discretion of the Commission instead of the discretion of the Congress. And not only is it a delegation of legislative power, but it is a delegation of all the power the Congress has on the subject, for Congress cannot constitutionally make a rate that is not a reasonable and just rate. If extortionate the courts would enjoin at the suit of the shipper, and if confiscatory they would enjoin at the suit of the carrier—in both cases on the ground that property was being taken without due process of law.

But if this bill be enacted and be upheld, notwithstanding these objections, then another serious legal question arises. By the sixth paragraph of the ninth section of Article 1 of the Constitution it is provided that "no preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another. * * *"

(Senator Foraker then gave a history of port differentials.)

From the quotations made, and others that might be made, it is clearly shown that the purpose of these differentials is to measure as nearly as may be the respective advantages and disadvantages of the ports of entry named; and what is true as to New York, Boston, Philadelphia and Baltimore, is equally true as to Newport News, New Orleans, Galveston, and other ports of entry, and the purpose of these differentials has no relation, except indirectly and incidentally, to railroad rates, but have reference solely and directly to their effect on the respective ports of entry.

Railroads are not restrained by any law or constitutional provision from making agreements of this character. That they are of the highest importance not only to the ports with respect to which they are made, but to the whole country, is universally conceded. Without these differentials there would be a natural tendency to concentrate exports at the port having the best harbor and shipping facilities, provided it could be substantially as easily reached by rail from the interior. The differentials are, therefore, essential to the maintenance of the system of diffusion and distribution that is now in force as to our export traffic, and which is of such vast importance not only to the railroads and these different cities, but to the whole country. But to maintain these differentials means that cities are not to have the benefit of their natural advantages, for they are to be offset or overcome by the differences in rates that are agreed upon.

The entire history and purpose of these differentials show that they are not indirect nor incidental preferences for the ports they favor, but that they are direct and intentional for the express purpose of overcoming the results of natural advantages and natural competition. Preferences are their principal purpose, not an incident. The cities themselves recognize this, for it was the cities and not the railroads that asked for the recent hearing before the Interstate Commerce Commissioners, sitting as arbitrators, when they had occasion to deliver the opinion from which I have quoted.

Now, as to the application of all this. If Congress undertake to exercise its power to regulate interstate commerce, it must exercise that power subject to all the restrictions and limitations imposed upon it by the Constitution. It must, therefore, avoid, in the exercise of this power to regulate, coming in conflict with any other constitutional provision that has application to it.

The Hepburn bill seeks to avoid the question by entirely ignoring differentials in connection with its expressed purposes. This is open confession that Congress has no power, acting directly by commission or otherwise, to observe these differentials in the making or fixing of rates. Thus the authors of that bill acknowledge that the whole system of differentials is founded on a purpose to give direct preference to the ports respectively favored at the expense of other ports, and, therefore, if done by Congress, in contravention of the constitutional provision under consideration.

The Commission clearly understands that the sole purpose of the differentials is to interfere with and affect the results of natural competition, thus directly and intentionally aiding one city to the corresponding prejudice of others. This is something carriers, unrestrained by law, are at liberty to do, and something that is of great advantage to the whole country, but which the Congress is expressly prohibited from doing, because it shall give no preference whatever as between the ports of different States.

But if we invest the Interstate Commerce Commission with the power to make rates it must exercise that power subject to this prohibition of the Constitution that there shall be no preference for the ports of one State over those of another. The whole system of differentials must in consequence be abandoned. As a result each city will then be entitled to its natural advantages, not only of location but of railroad and shipping facilities and every other kind of advantage it may possess. As a practical result New York will at once have over Boston, Philadelphia, Baltimore, Newport News, and all the other competing ports of entry, respectively, the advantages measured by their respective differentials.

THROUGH ROUTES AND JOINT RATES.

The Interstate Commerce Act of February 4, 1887, provided for the supervision by the Interstate Commerce Commission of through routes and joint rates, but the provision of that act with respect to through routes and joint rates applied by its terms only to the common carriers "subject to the provisions of the act."

In other words, the provisions of that act as to through routes and joint rates were limited in their application to carriers engaged in transportation wholly by railroad and transportation partly by railroads and partly by water, which carriers were "under a common control, management, or arrangement for a continuous carriage or shipment," etc. The provisions of the statute applied when the carriers, if they were separately owned and entirely distinct from and independent of each other, themselves established a through route and made an agreement as to the terms and conditions upon which freight and passengers should be transported over it. There was no attempt to compel carriers that could not so agree, or, for any reason, would not so agree, to submit to the establishment of through routes and joint rates, and the apportionment of the same by the Interstate Commerce Commission.

But the first section of the Hepburn bill amends the first section of the Interstate Commerce Act of 1887 so as to make it read in this particular as follows:

> That the provisions of this act shall apply to any common carrier or carriers engaged in the transportation of passengers or property wholly by railroad (or partly by railroad and partly by water when both are used under a common control, management or arrangement for a continuous carriage or shipment) from one State or Territory of the United States to another, etc.

The effect of this amendment is to make all its provisions applicable to all railroads without regard to whether they are under a common control, management or arrangement or not, and to routes made up partly of rail and partly of water transportation only in a certain contingency, namely, when, as under the old statute, they are subject to a common control, management or arrangement.

What it is thus proposed to do can be done, and done legitimately, but it cannot be done in the way provided in this bill. What this bill thus provides for is a taking of private property for public use, and although that property, if you take again the Pennsylvania road for illustration, is already subject to a public use, it may be put to an additional public use, namely, a use by the connecting carrier or carriers to the extent indicated, but private

property taken for a public use, although it may be a railroad already devoted to public use, cannot be taken without making just compensation. The ascertainment of what is just compensation in such a case is like the ascertainment of what is just compensation in any other case, a purely judicial function that cannot be exercised by a board, but only by the courts. In determining what is just compensation in such a case not only must rates of fare and the apportionment of the same be considered, but the franchises and every other element of value that may be taken or affected must be taken into the account.

Congress has no power to dispossess the courts of their jurisdiction to fix this compensation, neither can Congress prescribe a rule by which the compensation shall be ascertained.

(Monongahela Navigation Co. v. the United States, 148 U. S., p. 312.)

THE BILL ELIMINATES JURIES IN CASES WHERE THE PARTIES ARE ENTITLED TO THEM.

Section 5 of the Hepburn bill purports to amend section 16 of the Interstate Commerce Act as amended March 2, 1889. It would be more correct to have provided that what is set out in section 5 should be a substitute for section 16, because of the great dissimilarity not only in language but also in legal effect between section 16 as it now stands, of the interstate commerce act and the section as it will read if amended as proposed. Section 16 of the interstate commerce act as amended March 2, 1889, authorizes the Commission, or any party interested in any order the Commission has made under the provisions of that act, to apply by petition to the circuit court of the United States, sitting in equity, to enforce such order on complaint that the same is being violated, and the court may, in ordering compliance, make also an order for the payment by the carrier of such sum of money not exceeding $500 per day for each day that the carrier shall fail to obey its order of injunction or other process. This is in the nature of a fine for contempt, and therefore clearly within the power of the court to impose.

Controversies requiring a trial by jury are especially exempted from the operation of this provision of the existing statute.

It can not be claimed for the framers of this provision that they overlooked the fact that under the seventh amendment to the Constitution, in any action brought to recover money, if the amount involved be more than $20, the parties are entitled to a trial by jury, for the provision of law now in force, which they were amending, was framed with careful reference to that fact and so as to preserve that right. It would seem, therefore, that they have intentionally framed this section in plain disregard of that constitutional provision.

The bill does not provide for any proper review by the courts.

Many other objections and imperfections might be pointed out, but enough have been mentioned to show why the framers of this bill should seek by the terms of it to prohibit a full review by the courts of the orders and proceedings of the Commission, except only as to whether they have been "regularly made," which means nothing more than a review of the question in any given case, whether an order of the Commission condemning a rate and fixing another to take its place has been made in conformity with the proceedings and requirements of the statute, not whether the rate condemned was or the rate substituted is reasonable or just or fairly remunerative as the bill allows and requires.

The points mentioned are sufficient, however, to show that if by any possibility this bill should be both passed and upheld by the courts, the powers conferred by it upon the Commission are so vast that there is a special reason in that fact alone for subjecting the exercise of them to the most careful scrutiny and review by the judicial department of the Government, not only on behalf of the railroads, but also on behalf of the shippers.

And yet this bill, thus confessedly unsatisfactory to every member of the House committee and probably to every member of the House of Representatives, passed the House without amendment, because, as the newspapers announced, "the order had gone forth" that, while there might be debate, no amendment—no matter how necessary it might appear—should be allowed. The bill came to the Senate, and, so far as the committee is concerned, there has been a repetition of that experience. No matter what may be its defects and no matter what this, that or the other Senator may think, not an "i" shall be dotted nor a "t" shall be crossed of all this important measure. To even suggest that the bill is filled with unconstitutional provisions or that it will prove impracticable in operation is heralded as a species of treason and disloyalty —to whom or to what nobody knows. The whole proceeding is without a precedent in my experience as a member of this body and probably without a precedent in the history of the nation. If we are to abdicate our functions and permit such an imperfect, ill-advised and ill-considered bill to become a law, discredit will attach and disappointment will follow, not only to "those who desire such legislation," as the House committee suggested, but to all the people of the whole country.

It will prove thus disappointing because if it does not fail and perish in the courts, experience will shortly demonstrate the utter impracticability of satisfactory rate making by a commission.

What, then, are we to do? The answer is plain. We can accomplish everything desired by simply amending the Elkins law so as to broaden and strengthen it and make it more available.

This is easily done. An amendment making such provision will be offered at the proper time. I shall try to find opportunity to speak upon it then at such length as may be necessary to fully explain it. For the present it is enough to say that the purpose of this amendment will be not only to preserve the benefits of this salutary law, but to make them available, for every kind of case that can possibly arise, to the humblest shipper in all the land. This may be done by extending the provisions of the third section of the Elkins law to excessive rates, and by making it specifically applicable to every kind of rebates and discriminations as to both persons and places, and by making it the duty of the Interstate Commerce Commission not to act as judges, and legislators, and prosecutors, and sheriffs, but to address themselves to the purely executive duties of hearing complaints, exercising their powers of conciliation, and, where these powers fail and they find there is probable cause, sending the case at once, through the Attorney-General, to the proper court for immediate proceeding, in the name of the Government, for the benefit of all parties interested, without expense to the shipper.

The great difficulty shippers have had in the enforcement of their rights against the railroads has been that no shipper single handed and alone can, as a rule, afford to resort to the law with a railroad for his antagonist. The disadvantage is too great on many accounts, and particularly because the shipper is likely to be subjected to an expense he should not be required to bear; but if he can invoke the protection of the courts in the name of the Government, and without expense to himself, he will not fear to assert his rights, and if the railroad knows that it is charging him an unjust rate, or subjecting him to an unlawful discrimination, and that if it does not desist from such practice it will be called to account in the courts, where it will have the Government for prosecutor, it will in most if not in all cases make haste to agree with him.

Prompt Handling of Competitive Freight.*

The first thing in the prompt movement of L.C.L. freight is to start trains promptly. The receiving doors of freight houses should be closed at a fixed hour, say 5 p.m., and shippers given to understand that goods received after that hour will be held until the next day. Freight going not more than 200 miles should be at destination the next morning at 7 o'clock, and be at the platform ready to unload. Competitive freight should be put in cars carded with a large letter "C" and waybills should be stamped "COMPETITIVE." Carload freight should be reported by telegraph and be closely watched from the general office. The clerk in charge of fast freight records should be one who has had experience in the operating department and who is conversant with schedules, grades and local conditions along the road. The engines of fast freight trains should be kept in the best condition and should be loaded 15 per cent. lighter than on ordinary freight trains. A reduction of 10 per cent. from the standard load is not enough. The engine and train crews should be assigned regularly to the same runs. This is just as necessary as in passenger service. The crews will appreciate the work to be done, know the conditions and realize their responsibilities. They will also take pride in making good records. If there is anything in the wages agreement with trainmen to prevent the assigning of regular crews to fast trains it should be eliminated. It is important to so arrange the engines on different divisions that fast trains can be run through without breaking up.

It would be a great help to the traffic department if fast freight schedules were absolutely maintained; freight agents would then be relieved of any temptation to exaggerate when promising shippers good time. With anything but perfect service they have to draw upon their imaginations, and in striving for competitive freight their imaginations are liable to be slightly overworked.

A Year's Problems Epitomized.†

The calendar year which has just closed has been by far the most successful we have had in the operation of our western lines, with respect to the volume of business, increased train efficiency, reduction in expense of transport, improvement in the passenger service, and handling of package freight; and I think, also, that the movement of the wheat crop has caused less disturbance of the car and the power supply in districts not directly affected by that movement. There has also been greater efficiency in the carrying out of improvements and in the building of new lines. Much of the

*Extracts from a paper, read at a meeting of Canadian Pacific officers, at Field, B. C., Feb. 12 and 13, by R. R. Jamieson, General Superintendent of the Company at Calgary.

†From an address made by Vice-President William Whyte, in opening a meeting of officers' of the Canadian Pacific at Field, B. C., Feb. 12.

work has been hurried through and put in use for the handling of wheat traffic.

The disturbing factor that has given myself and the operating officers most grave concern has been the serious accidents. Let us see if by conference we can gain additional knowledge how to combat the influences or circumstances that lead up to this most regrettable feature. * * * I have urged most particularly upon all concerned the exercise of the greatest care in selecting men for the telegraph, engine and train service, and have pressed upon officers supervising these departments the importance of keeping their men's knowledge of the rules up to date; also to notice their habits. By careful selection, by getting men of character, and by inculcating obedience to the rules, we should leave only one chance which we cannot guard against—that of error in judgment.

The matters that I look for the most improvement in this present year are, first, the time of our passenger trains; acceleration of their speed as far as the track conditions will permit, and cutting out all dead time at stations; also the education of enginemen so that they will make greater effort to maintain their schedule, or to recover time, when starting behind time. Second, the first-class freight service. Third, the car supply for points distant from headquarters. Fourth, the hurrying home of foreign cars. In no account in our expenses have we made such an improvement as in this last, but the improvement has not yet reached my expectations.

I would urge upon all to curtail their correspondence. Do as much of your business as possible in personal contact with your officers, thereby leaving more time at your disposal for originating improvements in the handling of traffic.

Now that the rates of wages paid in all departments have gone up so much, we should take every means to cull from the service all who are not fully capable of giving service equivalent to the rates paid, and to secure a continued and improved economy in the employment of men in all branches of our maintenance work.

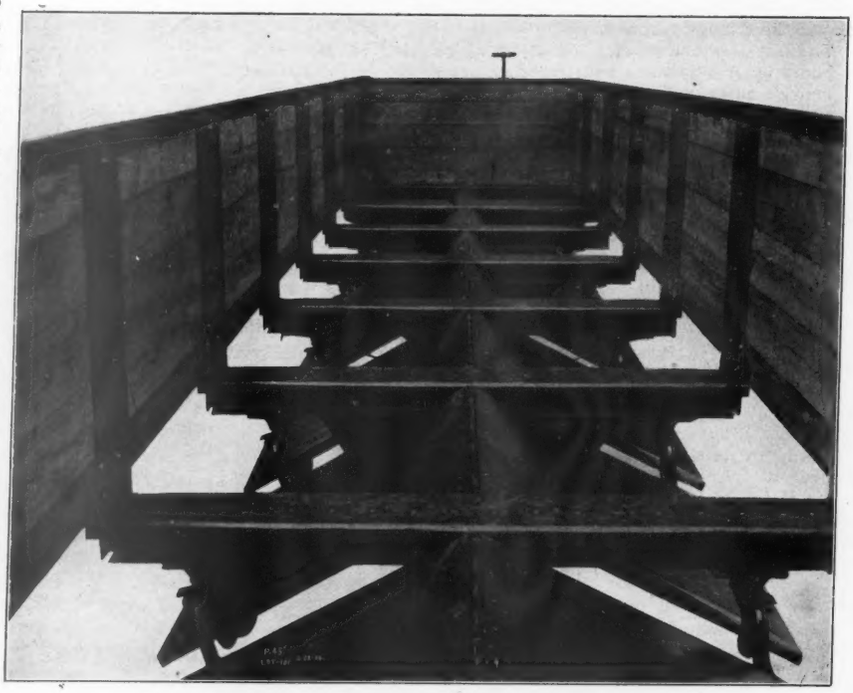
This company has been the pioneer in business enterprise in the west and should retain the lead. This is no small task, for the great increase in the wealth of the country has attracted shrewd men from many countries. If the officers and men of this company will see that all the business offering to it is taken care of promptly, and that all its trains, passenger or freight, are run strictly to schedule; and that the fine courtesy on the part of its employees, for which this company is already celebrated, is maintained, we have no need to be alarmed at the advent of competing lines.

The Minister of Commerce in charge of the Hungarian State Railroads has issued an order forbidding employees concerned in train movement (trainmen and most station men) to drink anything intoxicating while on duty and for eight hours before going on duty.

Ralston Dump Car and Steel Underframe.

The interesting design of flush-floor, drop-bottom gondola car illustrated herewith has recently been perfected by The Ralston Steel Car Company, Columbus, Ohio. The drawings show the improved design, embodying such changes as were indicated as being advantageous from trials of a sample car built for experimental purposes. The photographs show the first car of the improved design to be turned out. The general features of the design are so well shown by the illustrations that little need be said regarding details. The depth and construction of the girder center sills are worthy of special note, however, as is also the body bolster construction. The doors are raised and lowered by a longitudinal crank shaft on each side worked by a ratchet and lever at each end. In the improved design the number of doors has been increased from 12 to 16, and an important change in their length and method of hinging was made, as will be seen best by reference to the cross-section. The center sills were lowered, an I-beam placed on top of the cover plate, and the doors hinged above this with their backs adjoining, doing away with the material-holding space down the center of the first car. The doors are worked in sets of four by the ratchets and levers. Friction of the doors on the shaft is minimized by the use of small rollers on the latter on which the doors rest, enabling one man to raise the doors with ease.

Ralston Flush-Floor Drop-Bottom Gondola Car for the Toledo & Ohio Central.

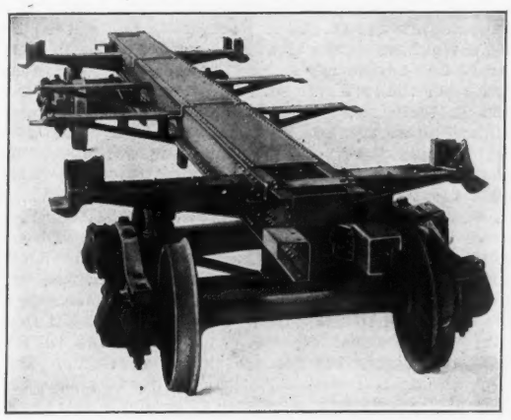


Interior of Ralston Drop-Bottom Car With Doors Dropped.

Also included in the illustrations is a view of a steel underframe design which this company uses in repairing and rebuilding

equipment, of which it does a great deal. The center sills are two 15-in. channels with ¼-in. by 20-in. top and bottom cover plates between bolsters. An 11-ft. reinforcing plate at the center of the sill of the same dimensions completes the box girder. The ends of the center sills are notched and turned down for the wooden end sills.

The needle beams are worthy of note. The top plate is ⅝ in. by 8 in. and is continuous, passing through the center sill webs. The bottom plates are ¾ in. by 8 in., and each passes beneath the center sill flange, being riveted thereto. The plates are riveted together securely at their outer ends and cast-iron filler blocks



Ralston Steel Underframe.

between complete the member. The beam is so designed that when the underframe is applied to the body of an old car the same bolt holes that served for the wooden needle beam can be used for the new one.

The construction of the body bolsters is similar to that of the needle beams, except that the bottom plate is also continuous and the bottom flanges of the center sills and the web are cut out to accommodate it. The sills are reinforced by a ½-in. thick plate at this point. In the application to an old body, the old bolsters can be used by fitting them to the center sills and holding them by a ¼-in. cover plate beneath, to which the old center bearing is riveted. This raises the side bearings ¼ in., serving to counteract the permanent set usually existing after a period of service.

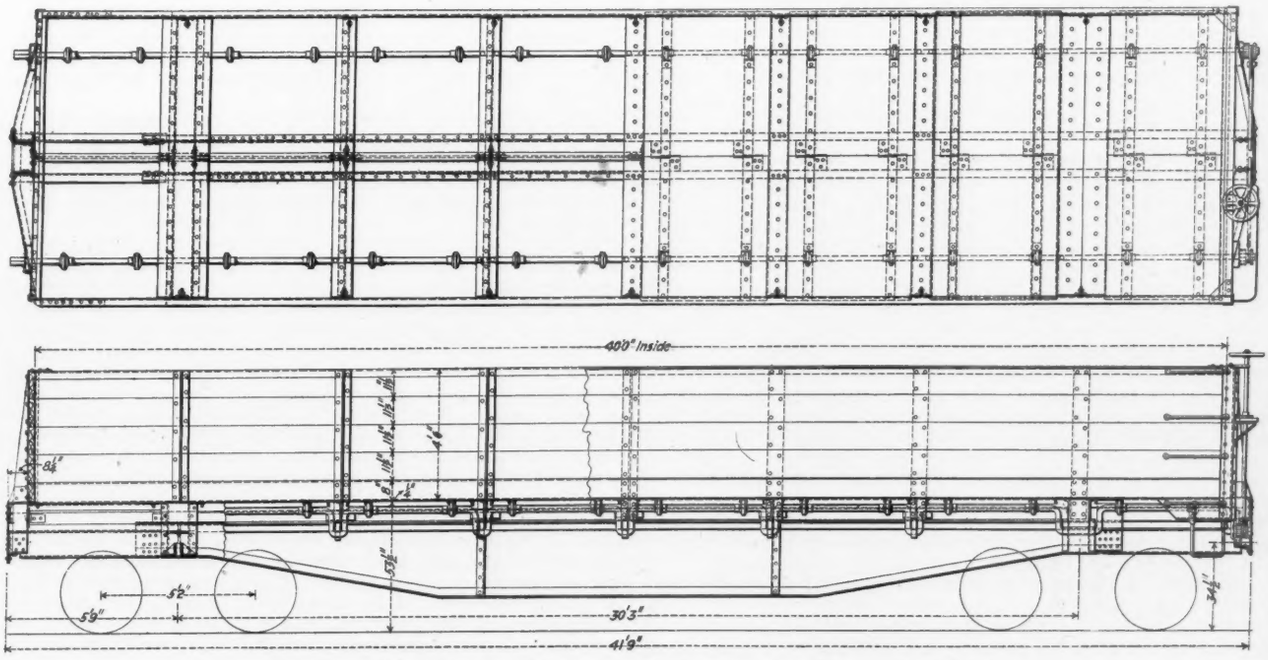
The method of handling the cars in making these repairs is of interest. The old cars on being brought in are fitted at each end with a trunnion which clamps over the end sill above the coupler. The hooks of two cranes are attached to the trunnions and the body lifted off of the trucks, turned over and laid on the floor, enabling the easy removal of the truss rods and brake rigging. By this means the car is stripped in about one-fifth the time that would be required if it were lifted upright and the workmen went under it. The center sills are removed by means of the cranes if necessary. Any needed repairs are then made on the floor, the body painted and stenciled and the underframe applied, little time being required for this last operation. The body is then reversed, set on its trucks and moved into the yard, where any minor repairs needed are made.

The Ralston Steel Car Co. fitted up its present plant in Columbus about six months ago.

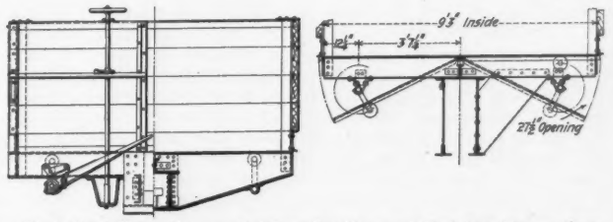
How to Improve Passenger Service.*

There are three essential features in the maintenance of an efficient passenger train service. First, the track. Second, the equipment of the passenger trains, including ventilation and cleanliness. Third, the manning of trains with capable men. Track will be treated by other officers in a separate paper, but we may point out that the preparation of the time-table is intimately connected with the condition of the track. The writer has heard many complaints relative to the nervousness of passengers in the swing of long sleeping cars on curves, due to running trains faster than the elevation of the rail provides for; we alone afford the opportunity to passengers to travel by one line across the Continent, and it behooves us to make every reasonable provision to make such a long journey pleasant, entertaining and satisfactory. There always will be a certain amount of tediousness in such a long journey, the only relaxation a passenger has, outside of ordinary literature and the magnificent scenery in the mountains, is to take a turn on the platform when the opportunity is afforded. The value of buffet and library cars and combination parlor and observation cars is in relieving the tediousness of the journey. We use observation cars on the Pacific division, but this only embraces a small proportion of the journey, and the physical characteristics of the mountain journey are so attractive that time passes more rapidly

*A paper presented at a Canadian Pacific officers' conference at Field, B. C., Feb. 12, by R. Marpole, General Superintendent of that company at Vancouver—condensed.



Plan and Side Elevation of Ralston Flush-Floor Drop-Bottom Gondola Car.



Part End Elevation and Cross-Sections of Ralston Dump Car.

than when passing over other sections of the line where the want of points of interest creates monotony.

At times the engines in fast passenger trains were not in first-class condition, and too few engines were run in that service. Too much importance was attached to the mileage performance of such power, with the result of vexatious delays. The practice of restricting the allotment of passenger power to the bare necessity is a mistake, and a costly and aggravating one at that. It is absurd to put at the front end of a train an engine which is not either in appearance or condition fit to handle it. We must have the best of our power allotted to our fast passenger trains, to make it in keeping with the composition of such trains, as well as to avoid aggravating delays. If a man has one or more tally-hos in a city for the purpose of securing the patronage of visitors—tourists and the like, and he has competition for such business and desires to advertise and make a good name for himself, he does not put in front of the coach a horse affected with disease occasioned by overwork or natural defects. One of my superintendents says that the practice of using passenger engines in freight service, in order to make a mileage showing is a vicious one; engines assigned to passenger service should be kept only for such service.

A prolific source of annoyance to passengers is that of being compelled to go into a nauseously odorous lavatory—the unsanitary condition of these apartments in the summer season has called for many complaints from our patrons [And those of every other road that we know of.—Editor.] and the nuisance must be abated in some way: I refer particularly to first-class and colonist cars; trainmen are remiss in their attention to the lavatories—more frequent examinations and the application of an effective deodorizer and disinfectant is necessary; and this material should be supplied to the brakemen and held by them in a receptacle in one of the cars. If kept in the train box in the baggage car, the men as a rule will not take the trouble to fetch it.

Conductors should make a periodical inspection of all the lavatories in the train, including the tourist and sleeping cars. We now have sleeping car conductors, who will look after the work of the porters, but the conductor of the train must understand that this arrangement does not relieve him of the task of making a close inspection of all cars.

The poor ventilation of cars is a source of complaint, but it is a difficult task to satisfy every occupant of a car in this respect. Regulating the heating of cars requires to be closely watched by the train crew—passengers may be made extremely uncomfortable by inattention or ignorance. With our peculiar and rapid variation of temperature, it occurs to me that special drilling of the men is needed, and this by a competent man acting as train inspector.

An article in the *Railroad Gazette* says "It is against public policy—an injury to the people of the state—that a Railroad Superintendent should use any other than the best man available to run the locomotive of a fast express train." For the first few years all enginemen are in some degree uncertain quantities; but by the time these men are entitled by seniority to promotion as passenger engineers, their fitness therefor should be pretty well known to the road foreman, and through him by the Master Mechanic—I think we now have a loyal, reliable and competent lot of men in the passenger service—and who are anxious to maintain a good record in the operations of trains. The satisfactory movement of trains depends largely upon the engineer—given a machine in good condition and not overloaded, a fireman with brains as well as muscle, and good fuel and water, he will cover his run with despatch, and with a certain amount of pride. The selection of suitable men for firemen, and especially for passenger trains is important. I am satisfied that lots of delays to such trains have happened through the incompetency of the fireman. The subject of securing a better class of wipers and consequently good firemen, will be introduced at this meeting.

Passenger trainmen are not always as quick in their movements as they should be, and this remark applies especially to the brakemen. I am in favor of appointing Train Inspectors, who should travel constantly from point to point on passenger trains, detecting and reporting, or posting men who are not properly performing their duties. While it may be claimed that this is the duty of the Trainmaster or Superintendent, it is not possible for these officers to give the close and expert attention to the work that it undoubtedly warrants; we have inspectors for nearly every departmental work, and it occurs to me that it would be to the company's interest to copy the example of the Southern Pacific. The selection of suitable brakemen for the passenger trains is a matter of importance—we should only engage men for this service who are fairly educated and have a smart appearance, and who are able to converse intelligently and intelligibly with passengers—this applies especially to that section of the line where we have something of interest to show our patrons. It is gratifying to state that our train employees are noted for their unvarying courtesy and politeness to passengers—and this is a feature that has helped to make the Canadian Pacific popular with the public. The neat and natty appearance of trainmen is quickly noticed by, and pleasant to passengers. This remark applies to conductors as well as brakemen. It is a recognized rule that the officers of our steamship department are to wear white shirts and black bow ties and boots—we should follow this practice as regards trainmen.

Our last summer's record of transcontinental passenger trains was unsatisfactory. While no human foresight can always prevent the detention of trains; it is well known that a very large percentage of the causes were preventible—the use of defective power, poor fuel and water, overloading, and a time schedule too fast. When such a condition becomes chronic it soon results in a general deterioration in the service and demoralization of the employees concerned. We have as loyal and efficient a class of employees in our train and engine service as any other railroad in America—and to further the improvement in our train service we must sustain them in their efforts to give satisfaction to and enlist the good will and favor of our patrons by practising what we preach—providing proper power and good fuel and water, and the most expeditious means of supplying fuel and water to the engine.

From an old copy of the *Railroad Gazette* I take the following: "A letter in a recent issue to the effect that the average individual would rather ride on a train running on a slow schedule and 'get there' on time, than start under the hallucination of high speed and reach his destination late is a reiteration of a remark that so many men have made before that it has become threadbare—yet there seems little hope of its ever reaching the eyes and permeating the brains of the men who have to do with making time-tables and controlling the movements of trains. The large percentage of late trains on American railroads makes the close calculation of connections a pure case of gamble."

The demoralization that follows the movement of continuously delayed trains means a loss to the company in delays to freight trains, and where dining cars are not handled on the transcontinental trains, and meals are supposed to be taken at hotels and restaurants, delays are most exasperating to the passengers. They either have too long a time between meals, or else must eat at hotels or restaurants where no provision can be made to provide suitable meals. The only remedy for such a condition is to use a dining car on every train from coast to coast. If trains are on time and the mountain hotels are not overcrowded with regular guests, it is perhaps not necessary to haul dining cars over the Mountain section—but judging from our experience of last year, it seems to me to be an important feature in our efforts to "improve our passenger service" to use dining cars over the entire run—Montreal to Vancouver.

Passengers like to get out for a meal and relaxation and to view the magnificent scenery at Field and Glacier when the opportunity is afforded them, but only at seasonable hours; delicate women and children should not be expected to get out of a train for the purpose of taking a meal at unseasonable hours or in inclement weather.

Finally, I may say that in my experience delayed trains, especially near the end of a long and tedious journey, create more disappointment and worry and cause more harsh criticism of our train service than almost any other feature in it. With comfortable cars, for sleeping or sitting, good wholesome food at reasonably moderate prices, civil attention and delivery sharp on time at destination we shall ensure satisfaction to the passengers and a good name for the company.

There is one other source of discomfort which should and can be remedied—the stops at water tanks. The injudicious manipulation of the air-brake in making a short stop at a water tank causes discomfort and alarm to the passengers. The writer visited Winnipeg twice in two months last year and particularly noticed the occasional violent character of the stops made at water tanks. It behooves Superintendents and Trainmasters as well as Master Mechanics and Road Foremen to detect and promptly discipline enginemen who are guilty of this totally unnecessary act.

. . . There should be a stand-pipe at the other end of the platform from the tank so that trains in either direction need make only one stop for station and water and thus avoid a cause of discomfort to the occupants of the coaches—the fewer stops made by an important train the greater is the satisfaction of the passenger. That excellent journal, *The Railway and Locomotive Engineer*, says: "The aggregate for extra costs for stopping trains is considerable and the possibility of saving is worthy of more consideration than it has received. The work which Mr. Peabody has done in directing attention to the cost of making unnecessary stops is highly creditable." If we provide a water supply to our engines by the method mentioned and thus curtail the number of stops, the cost of the extra stand-pipes and connections will be more than covered in a short time by the reduction in the wear and tear of the rolling stock and power and extra fuel used, as well as often in damage to the rails. I take it for granted that a paper will be presented by some other officer on the subject of station staffs.

Electrification of the Paris-Orleans Suburban Line.

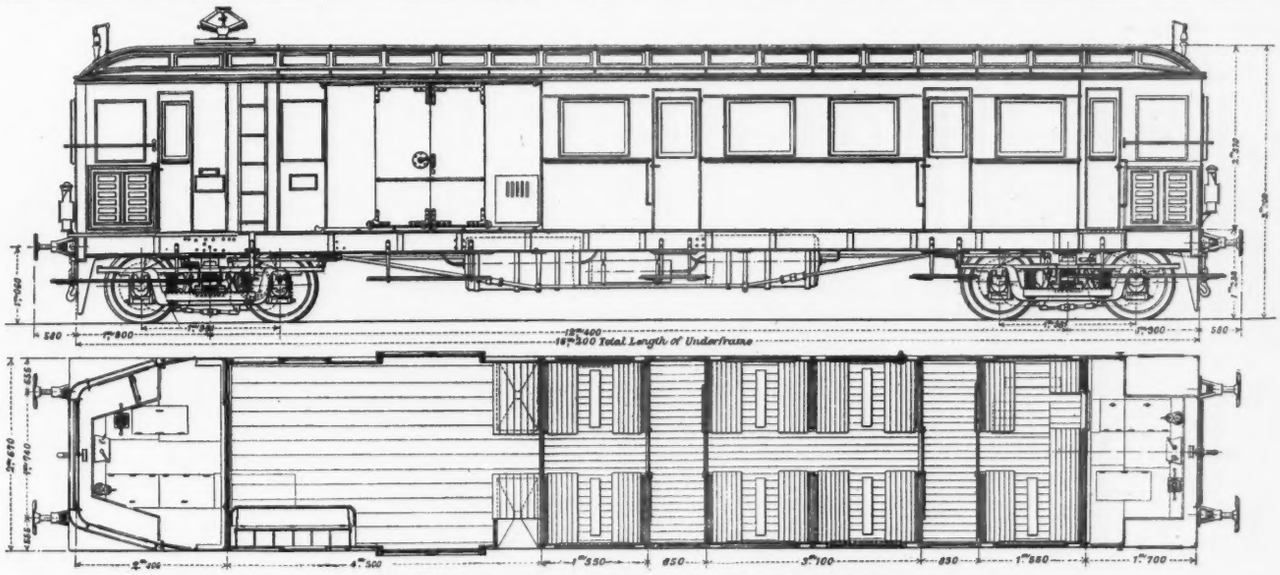
Engineering for January 5, prints the following description of the electrification project of the Paris-Orleans suburban line out of Paris:

The French railroad companies have hitherto moved very cautiously in the matter of electrifying portions of their lines. The first to adopt electric traction by locomotives was the Paris-Orleans Railway on the extension from their old terminus at the Quai d'Austerlitz to the new one at the Quai d'Orsay; but the primary object in view in this case was to prevent the emission of smoke and noxious gases inside the almost continuous tunnel which joins both termini. In a treatise on electric traction he has recently published, Mr. P. Dubois, one of the engineers to this company, appears to have been unfavorably impressed by the cost of electric traction on this extension built by his company within the city limits. He considers electric traction at best as an auxiliary to steam traction; he, however, recommended a trial on a small scale, and for part of the suburban traffic only. This trial is now being carried out, and the traffic with some of the nearer suburbs is being dealt with electrically; so far, however, the train service has not been sufficiently developed for the new system to yield all the advantages that may be derived from it.

Quite recently the Paris-Orleans Company doubled their lines from Paris to Brétigny, a distance of 20 miles, over which there are now four parallel tracks—two for main line and two for suburban traffic. Electric traction has been for the present limited to the Paris-Juvisy section, the company having decided that the traffic beyond the latter township did not justify departure from steam traction. It is very likely, however, that had the section been electrified further out than Juvisy, and had a logical extension in the number of trains followed the electrification of the longer section, a paying traffic would have rapidly developed, leading to increased profits and a better utilization of the power available at the generating station. In the work of electrification of part of the suburban line in question provision has been made with a view to meet future extensions, and the underground cables, which have been laid to Juvisy only, are amply suited to take the pressure of 11,000 volts, which would be required were the current to be carried as far as Brétigny. One of the advantages first derived from the transformation was the greater rapidity with which the electric suburban trains reached the Quai d'Orsay terminus without having to stop at the Quai d'Austerlitz for an electric locomotive; the saving in time is at least 15 per cent. Juvisy is 11.8 miles from the Quai d'Austerlitz terminus and 14.4 miles from the new terminus at the Quai d'Orsay. There are eight intermediate stations over the latter distance. The profile of the line is comparatively a very easy one; the gradients are 1 in 200, except over a length of about three-quarters of a mile at a point where the suburban lines cross the main lines, over which they are 1 in 100. At no part are the curves of less than 40 chains radius. The total distance is covered in 34 to 38 minutes by the trains which stop at every station, this corresponding to an average running speed of about 28.5 miles an hour. The through trains run the whole distance in 26 minutes, this giving a speed of 31 miles per hour.

For the electrification of this suburban line the system that was adopted for the extension to the Quai d'Orsay has been followed, and traction is effected by electric locomotives or rail motor-cars, which take continuous current at 600 volts from an outside third rail. The current generated in the central station is 5,500-volt three-phase, transformed down and converted in three sub-stations. For the extension to the Quai d'Orsay, two small sub-stations had been put down for this purpose; one of these has been done away with, and has been replaced by another, which has been installed within the generating station building. A third has been built at Ablon, a distance of eight miles from the generating station. The power of the latter has been considerably increased, and it now contains three electric generators of 1,000 kilowatts each, direct coupled to four-cylinder triple-expansion Corliss-Dujardin tandem steam-engines, having cranks at right angles.

The steam-valves of the high-pressure cylinder only are controlled by the governor. The engines run with superheated steam; all the cylinders are steam-jacketed. Each engine, at a speed of 75 revolutions, develops 1,500 indicated horse-power, with a cut-off equal to 0.046 the volume of the low-pressure cylinders; the output, however, with later cut-off, may be raised to 2,250 horse-power. When running under the most favorable conditions, the steam consumption does not exceed a maximum of 11 lbs. per indicated horse-power hour. The fly-wheel has a diameter of 24 ft. 7 in.; its rim weighs 33 tons. The alternators are Thomson-Houston 40-pole machines, with fixed armatures and revolving fields. Each alternator weighs 38 tons, and has a normal output of 1,000 kilowatts; it can withstand a 25 per cent. overload during two hours, and one of 50 per cent. during five minutes. The exciting current is at a pressure of 125 volts, generated by three continuous-current compound-wound dynamos. Steam is supplied to the engines by 12 Babcock & Wilcox boilers, mounted in four sets, and provided with super-



Electric Motor Car for the Paris-Orleans Suburban Service.

heaters and economizers. A large portion of the fuel used consists of slack coal mixed with the cinders taken from the locomotive smoke-boxes. The boilers are fitted with Bennis automatic stokers; the ashes are removed automatically, the machinery being driven electrically. The main switchboard is at one end of the engine-room; the high-pressure switches are operated by a system of levers. There are two sets of high-pressure bus-bars, so that the traction service can be separated from the lighting service. The static transformers at the Quai d'Orsay sub-stations lower the pressure of the three-phase current from 5,500 volts to about 370, the rotary converters converting the latter current to continuous at about 600 volts. The high-pressure three-phase current distribution to the furthest sub-station, at Ablon, is through two underground three-phase mains, in parallel, one of which would suffice, were the other to be put out of service. The mains contain three conductors, 80 square millimeters (0.12 sq. in.) in section, paper-insulated and lead-covered. They have been tested at the manufacturers' works at a pressure of 40,000 volts, and in the conduits at a pressure of 30,000 volts during one hour.

The current for traction is picked up from a third-rail. On starting the trains take a current amounting to as much as 1,500 or 2,000 amperes, and the third-rail has been given a high conductivity in order to limit the drop in pressure. It consists of a mild-steel flanged rail, weighing 100 lbs. per yard, along which are placed, for the greater part of the distance, two lengths of mild-steel rails, fitted as fish-plates and forming counter rails; the latter weigh 50 lbs. per yard. The three rails are bolted together every three meters. They are in 72-ft. lengths, and are electrically bonded at each joint by four flexible copper bonds 0.34 sq. in. in section, two being for

the third-rail and one for each counter-rail. The third-rail is protected by planking at the stations and at a few other points where foot traffic is large. In order to increase the conductivity of the return circuit the track-rails of the neighboring main lines for steam traction are electrically bonded, as well as the tracks for electric traction; junction boxes are mounted along the track in the usual way.

The railroad company has increased the number of its electric locomotives, and has recently put in service, besides, five electric carriages, or rail motor-cars. It now owns 11 electric locomotives, in the latest of which a part of the body serves as a luggage-van. They are carried on two bogies. Their principal dimensions are the following:

Length of underframe	33 ft. 6 in.
Total length outside buffers	37 " 4 "
Inside width	8 " 10 "
Outside width	10 " 2 "
Height above rail	12 " 8 "
Wheel base of trucks	7 " 10 "
Distance between truck centers	18 " 6 "
Diameter of wheels	4 " 1 "
Total weight of locomotive	54 tons.
Drawbar pull on starting	19,900 lbs.
Drawbar when running	13,300 "

The electric locomotives are fitted with four 270 h.p. motors, each driving an axle by gearing, and capable of giving a speed of 43.5 miles an hour to a 200-ton train. Series-parallel control of the motors has been adopted. As is the case with the older type of electric locomotives built for the extension to the Quai d'Orsay, the newer type is also fitted with a sliding contact at top for collecting current from the overhead conductor, formed of ⊥ bars, over switches and crossings.

The electric carriages, or rail motor-cars, contain three third-class passenger compartments, to seat 32 passengers, and a luggage compartment. They have the following dimensions:

Length of underframe and body	53 ft. 1 in.
Length outside buffers	57 " 0 "
Inside width	8 " 4 "
Outside width	10 " 6 "
Height above rail-level	12 " 6 "
Wheelbase of trucks	6 " 6 "
Distances between truck centers	40 " 8 "
Diameter of wheels	3 " 4 "
Weight empty	42 tons.

The underframe throughout is of steel. The body is built up of non-flammable wood. The flooring is covered with an asbestos compound, and with a steel plate at the part above the motors. The outside panels are covered with sheet steel. No wood has been used in the fittings of the motorman's cab. The motors are enclosed 125-h.p. machines. One motor is mounted on each axle, and it weighs, with its gear, 4,077 lbs. The working of each group of motors is on the Sprague-Thomson Houston multiple-unit system. The current is collected by lateral slide-shoes, and, as in the case of the locomotives, by a sliding contact at top, which comes into play when the third-rail is replaced by an overhead conductor. The carriages are heated electrically on the Parvillée system; they are lighted electrically by a separate circuit from the third rail. Each electric carriage can haul seven trailers. A train thus made up weighs 175 tons empty, and affords seating accommodation for 520 passengers.

Hitherto the electric locomotives have run an average of 125 miles per day, and the electric carriages 155 miles, and have given satisfaction.

Washington Correspondence.

Washington, March 6.—One thing that is now regarded as being settled is that any railroad rate bill that is passed by the Senate will contain an express provision for the judicial review of orders issued by the Interstate Commerce Commission. When the Hepburn bill was before the House it was contended by Mr. Hepburn and others that the courts of the United States would have inherent jurisdiction of all applications for review that might be made. Mr. Hepburn took the extreme view that, under his bill, the courts could consider not only the question of whether rates made by the Commission were confiscatory, but could also inquire into the reasonableness of the rates prescribed in the order and could even go back of the order itself and pass upon the question as to the reasonableness and lawfulness of the original rates undertaken to be set aside by the Commission. In other words, he contended that the courts could examine the whole matter in controversy, including matters of fact as well as questions of law, and could try the whole case de novo. Mr. Stevens, another member of the Committee on Interstate and Foreign Commerce, did not go so far as Mr. Hepburn, but contended that the courts would have "more or less" power of review.

Since the bill passed the House some of the Senators in favor of a review amendment have been studying the question, and, when the bill is taken up by the Senate they will contend that there is no such thing as the inherent jurisdiction of a United States court, and that such courts, from the Supreme Court of the United States down, have no jurisdiction except such as has been conferred upon them in express terms, either by the Constitution of the United States or by act of Congress. This contention is based on a long line of decisions by the Supreme Court of the United States, the earliest being that in the case of Turner vs. The Bank, decided in 1799. It is contended that, as the Supreme Court said in the case of Cary vs. Curtis, "The courts created by statute must look to the statute as the warrant for their authority," and that "the courts of the United States are all limited in their nature and constitution, and have not the powers inherent in courts existing by prescription or by the common law." The contention is that unless a specific provision for judicial review should be put into a bill the jurisdiction of the courts as to questions arising under it would be restricted to constitutional questions.

It is evident that much difficulty will be experienced in framing a review amendment that can secure the support of a majority of the members of the Senate, especially if the Democrats unite in insisting that the courts shall be denied authority to suspend the operation of an order pending its review. This is understood to be what President Roosevelt now favors, and he also favors so limiting the rights of review as to prevent the court from inquiring into the reasonableness and lawfulness of the original rate. Notwithstanding Senator Tillman's emphatic declaration that the President has nothing more to do with the rate bill until it reaches him for his approval or veto, Mr. Roosevelt is not keeping his hands off. He is still pressing his views upon Senators and is exerting his influence in such ways as to greatly increase the bitterness of feeling against him on the part of Senators, some of whom have been among his strongest supporters in the past. These Senators complain that the President is using his power of appointment to influence Senators seeking places for their constituents, and it is also alleged that White House influence is being exerted in the House of Representatives to prevent the passage through that body of bills in which Senators not in harmony with the President are interested. On the whole, conditions are ripe for a very acrimonious debate when the railroad bill is taken up.

The speech of Senator Foraker on the constitutional questions involved in the Hepburn bill has produced a marked effect in the Senate. It has raised grave doubts in the minds of some of the lawyers in that body as to whether the Hepburn bill is not fundamentally unconstitutional and as to whether it would not be the height of folly for Congress to put it on the statute books only to have it wiped out by the Supreme Court when the first test case should reach that tribunal. It is not probable, however, that these doubts will be strong enough to change many votes on the question of the passage of the bill. It is not expected that more than two or three Senators will stand out with Senator Foraker against the passage of any bill giving the rate-making power to the Commission, whether that power is to be exercised subject to judicial review or not.

One of the questions that will come up during the debate will be as to the extent of the power over the relation of rates that the bill would give to the Commission. Even Senator Dolliver might favor an amendment if he could be convinced that the bill in its present form gives a large measure of such power. In his speech he defended the decision of the Supreme Court in the Maximum Rate Case and took very strong ground against giving to the Commission such power as it attempted to exercise in that case. Opponents of the Hepburn bill contend that, under it, precisely such a complaint as was made in the Maximum Rate Case could be presented to the Commission and that the Commission could make just such an order as it made in that case. Mr. Dolliver will not admit that this is true, but that it will be strongly argued during the debate, though it does not seem probable that any amendment can be adopted that will restrict the power of the Commission in this respect. Many of the arguments for a judicial review amendment are based on the contention that the Commission would have a large measure of power over the relation of rates and that judicial review is necessary in order to prevent that power being used to apportion commerce among communities in accordance with the theories of the Commission as to the relative importance that rival localities should have.

J. C. W.

Foreign Railroad Notes.

The first passenger train through the Simplon Tunnel left Brieg at 8.46 a.m. Jan. 25, and arrived at Iselle at 9.33. The train consisted of a locomotive and four cars. This was an experimental train. The opening for traffic will be much later.

The Italian State Railroads have established an office in Cardiff, Wales, for the purchase of coal. The Italian coal dealers don't like it. Italian manufacturers were asked to submit bids for very large quantities of rolling stock. They bid, but the authorities found the prices so high that no bids were accepted; and now they threaten to ask foreign manufacturers to bid; which will probably induce the Italians to modify their figures.

GENERAL NEWS SECTION

NOTES.

Hearings are being held in New Jersey on a bill authorizing trolley companies to carry freight.

The Japanese Government is reported to be considering the purchase of all the privately owned railroads in Japan.

During the month of February there were 150,000 more cars loaded on the New York Central Lines than during the same month of 1905.

It is proposed that Congress shall pass a law providing a $200,000 bonus for running a fast mail train from New York through Atlanta to New Orleans.

The first passenger wreck on the Bangor & Aroostook in its 12 years of operation recently took place, resulting in the severe injury of an express messenger.

A bill has been introduced into the New York State Legislature to broaden the liability of railroad companies for injuries to employees caused by the negligence of fellow-employees.

The steamer Homer Ramsdell, of the Central-Hudson Steamboat Company, made her first regular trip from New York City to Newburg on March 5. This is an unusually early opening of the Hudson river.

The joint grievance committee of Lackawanna conductors and trainmen at Scranton is reported to have been unable to reach an agreement with the officers of the company. A proposal to strike is to be voted on.

The Chicago Great Western and the Wabash are handling large quantities of corn from Nebraska points to Baltimore. The warm weather has checked the movement of corn to the Gulf, nearly all of it going to the Atlantic seaboard.

Grand Trunk locomotive engineers at Montreal have refused to accept a general wage increase of 4 per cent. in settlement of differences between them and the company. The points at issue have been submitted to a board of three arbitrators. The principal demand of the engineers is for a uniform rate, requiring the abolition of the sliding scale for different districts.

As part of the unification of the New York Central Lines, the Louisville, Ky., office of the White Line, a New York Central fast freight line, has been abolished and its business turned over to the Big Four traffic department. It is probable that similar action will be taken at other points where two or more agencies under the name of different roads in the system are each soliciting similar traffic.

The Wabash, by accepting a lower proportion of the Minneapolis rate on wheat and rye products to points east of the Illinois-Indiana state line, has reduced the rate on flour, Chicago to New York, from 17 to 16 cents. In addition, the milling in transit privilege has been granted. This tends to neutralize the advantage which flour millers in St. Paul and Minneapolis have had under the previously existing rates.

The Missouri Railroad Commission has reduced the rate on refined oil between Kansas City and St. Louis to 9 cents per 100 lbs., each way, the existing rate being 17 cents eastward and 20 cents westward. The independent refiners of Cleveland and Pittsburg have for some time protested against the existing rates on the ground that they favored the Standard Oil Company, which has refineries in Kansas City, and therefore does not need to ship refined oil west from St. Louis.

The grand jury of Putnam County, Ohio, sitting in Toledo, has indicted 12 county officials on the charge of stealing in connection with bridge contracts. This is only part of the bridge trust investigation there, for there have been 16 other indictments at this sitting. The grand jury has included in its inquiry every bridge company doing business in that county for the past five years. It is to be feared that if bridge contracts were as closely followed up all over the country the trail of graft would be found to extend very widely.—*Springfield Republican.*

Governor Pennypacker, of Pennsylvania, has vetoed a resolution calling for an investigation into the affairs of the Philadelphia & Reading Railroad Company and the Philadelphia & Reading Coal & Iron Company, and also a resolution directing the Attorney General to inquire by what right several of the railroads of the state are engaged in the business of mining anthracite coal. These resolutions, the Governor holds, were not germane to the call for the recent extra session. He also failed to approve a resolution requiring him to call an extra session of the legislature for the enactment of a two-cent-a-mile passenger rate law and a law giving electric railroads the right to carry freight.

The American Institute of Mining Engineers Entertained by Ingersoll-Rand Company.

The American Institute of Mining Engineers, who for the two days preceding had been in annual session at Bethlehem, Pa., were on Saturday, February 24, entertained by the Ingersoll-Rand Company at their works at Phillipsburg, N. J. A special train brought the visiting party, about 165 in number, from Bethlehem direct to the shop grounds. The guests were received by President W. L. Saunders of the company, assisted by members of the sales and engineering departments, both from Phillipsburg and New York. Each guest was given a leaflet showing a plan of the works, in black, with the route of the visitors through the shops, in red. In addition, the leaflet contained tabulated engineering data of the shop arrangement, equipment and capacity, together with a record of the company's machine production since its formation in 1871.

After inspecting the plant a luncheon was served in the dining room on the third floor of the office building, where during the luncheon each guest was furnished with a printed blank, to be filled out with name and address, and promising to each whose signature appeared a framed photograph of the day's meeting, with appropriate literature.

Murder in a Railroad Compartment.

The substitute for the American train robbery in Europe is assassination in a car compartment, where the victim is isolated, and has no protection by fellow-travelers or trainmen. An instance has lately occurred in France. An architect and contractor of Geneva, Switzerland, sold some property in Nice, on the Mediterranean, and had about $70,000 of the proceeds to take home. His wife, and, as it appears, other people, supposed that he would take it on his person. He took a night train from Nice to Geneva, and telegraphed for a servant to meet him at the Geneva station. He did not appear when the train arrived, but his hand baggage was found in a first-class compartment, where the cushions and floor were covered with blood, while bloodstains marked the outside of the car behind this compartment. Search was made along the track, and between two small stations about 50 miles from Geneva the body of the architect was found with his throat cut. It turned out, however, that he did not have the $70,000 with him, but, like a rational man, had remitted the amount to Geneva by check. The perpetrators of the murder not only missed their booty, but were, two in number, caught and have confessed, and will probably soon be executed. Here the parallelism with American train robbers fails.

New Eastbound Passenger Rate War.

The eastbound Chicago-New York passenger rate troubles of last August, resulted in giving the Michigan Central the privilege of charging a lower rate on some of its passenger business than the standard rate lines, the Lake Shore and the Pittsburg, Fort Wayne & Chicago. To this settlement the Grand Trunk at that time announced that it would not permanently agree. It has now filed notice with the Interstate Commerce Commission of its intention to reduce rates to New York and Boston on March 10 to the following basis:

To New York by way of Suspension Bridge or Buffalo and the New York Central, $20 first class and $17 second class; by way of the Grand Trunk and any other line, except the New York Central, $16 first class and $15 second class.

To Boston by way of the New York Central and Boston and Albany, $22 first class and $19 second class; by any other line, $16 first class and $15 second class.

These rates are $2 to New York and $3 to Boston below the regular differential rate and $4 to New York and $6 to Boston below the regular standard fare. Notice of the new tariff was filed by telegraph.

A Large Reinforced Concrete Chimney.

What is said to be the highest concrete chimney in the world has just been completed at the Butte Reduction Works, Butte, Mont. The inside diameter is 18 ft. and its total height is 352 ft. 7 in. The foundation, which weighs upwards of 13,000 tons, is formed of slag, which was poured into an iron casing 100 ft. square. The base, which is of reinforced concrete, is 42 ft. 6 in. square by 8 ft. 3 in. high. The wall, of the chimney proper, for the first 20 ft. is 18 in. thick. Above this height the chimney is

composed of a double shell, consisting of a 5-in. inner and of a 9-in. outer wall, separated by a 4-in. air space. The entire weight of the chimney, including the concrete base and slag foundation, is 15,275 tons.

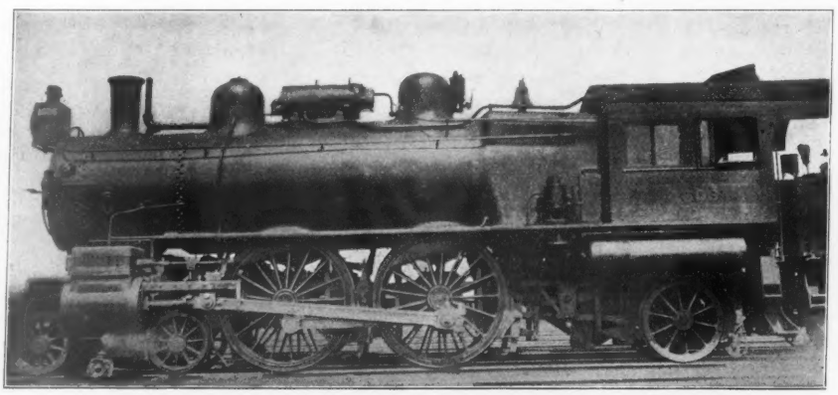
Steam Turbine Train Lighting Sets.

The General Electric Co., Schenectady, N. Y., has produced a new system of electric lighting for trains, which consists of a small Curtis steam turbine direct connected to an efficient generator. The combination of high speed with rotary motion produces a machine of compact and simple design. Because of the high speed the generator is small and light, and the absence of reciprocating parts eliminates wear, noise and vibration; all of which play a large part in the use of the ordinary engine. The generator for this outfit is a two-pole direct current machine, wound for 85 or 125 volts depending on the service required. The outfits are supplied in three sizes, one a 15-k.w. 80-volt generator coupled to a Curtis steam turbine running at 4,000 r.p.m.; the second a 20-k.w. 125-volt generator turbine driven at 4,500 r.p.m., and the third a 25-k.w. 125-volt generator driven at 3,600 r.p.m. These turbines can be furnished to operate at from 80 to 200 pounds steam pressure, and exhaust into the atmosphere.

On account of the compactness and light weight (1,850 pounds net) of the smaller size Curtis steam turbine generating set it can be mounted upon the locomotive or in the baggage room. When placed upon the locomotive as shown in Fig. 1, the exhaust connection can be conveniently led into the stack. When located in the baggage car, this generating set occupies a minimum amount of space for the power generated, measuring approximately 66 in. x 22 in. In order to be as close as possible to the steam supply and avoid condensation losses, the generating set is generally placed at the front end of the car and connected to the locomotive by means of a flexible steam hose and coupling. As the turbine is exposed to the weather when placed on the locomotive, protective sheet iron casings are fitted. As can be seen in Fig. 2 these casings completely surround both the turbine and generating elements affording adequate protection against dirt and moisture. In Fig. 3 the set is shown adapted for service in the baggage car. In this case the moisture proof covers are unecessary.

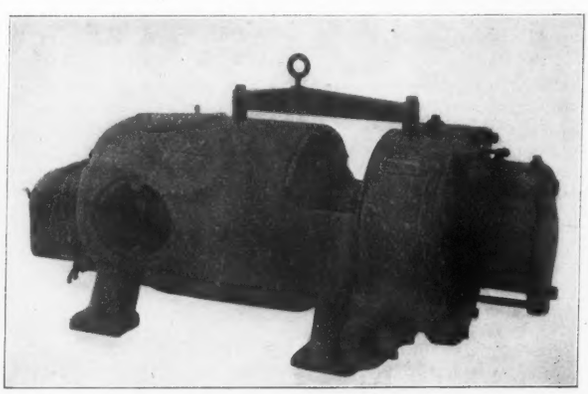
Curtis steam turbine lighting sets of this design are in use upon many railroads in the United States. They are adapted not only for general train lighting but also for locomotive headlights and thus add not only to the luxuriousness of American train service but in addition increase its safety.

The General Electric Co. also makes a complete line of the necessary fittings, including cables, instruments, couplers, lamps, fans, etc., for the equipment of electrically lighted trains.



15 K.W. Curtis Steam Turbine Generator Mounted on P.R.R. Atlantic Type Locomotive.

15 K.W. Turbine Generator and Casing.



15 K.W. Turbine Generator Without Casing for Mounting in Baggage Car.

The Italian Railroad Strike.

Italian authorities have reported on the strike of railroad employees last April, when it was said that pretty nearly the whole force struck. But a detailed statement of the number of men who did not report for duty on each day of the strike shows that 72 per cent. of the whole number of employees continued at work on that day when the greatest number were out. The proportion of trainmen who struck was greater, and of course this interrupted traffic out of proportion to their numbers.

Sanitary Inspection of New York Subway.

George A. Soper, Sanitary Engineer of the New York Rapid Transit Board, has made a report of an investigation of the subway in which he criticises the management for lack of cleanliness at stations and in cars. Dr. Soper says that he found more carbon dioxide in the subway between 5.30 and 6 p.m. than at any other time, and more at the Fourteenth street station than at any other station. He found on an average twice as many bacteria on the streets as in the subway, excepting after rains, when there were fewer outside than inside. The oily roadbed apparently collects from the air large numbers of the bacteria and is helpful rather than injurious. The doctor does not view the heat of the subway in summer with alarm. In fact, the conditions in winter, when strong draughts of cold air enter the stations, are far more apt to affect health. The difference between the temperature in the subway and in the streets was much less in hot weather than was generally understood. The average temperature of the subway in July and August was 5.6 degrees higher than that of the streets. If it is found feasible to cool and otherwise improve the air by refrigeration, fans or other mechanical means, the advantage of doing so is apparent, but if this result cannot be accomplished the consequences will not be found disastrous.

Of far more importance than the question of heat is the need of maintaining proper conditions of cleanliness in the subway, says Dr. Soper. The stations and toilet rooms have not been kept in a clean and orderly condition. The filthy condition of the roadbed at the stations and the neglected condition of ventilation and cleanliness in some of the toilet rooms may properly be regarded as suitable subjects for the attention of the Board of Health.

Dr. Soper recommends that the ballast of the roadbed at the stations be renewed or replaced by concrete, that the ordinances of the Health Board in regard to spitting be enforced, that dry sweeping be abolished and that the cars and stations now inefficiently cleaned, be scrubbed at least once a week and at night.

Electric Headlights on Street Cars.

The Railroad Commissioners of Massachusetts have issued an order relative to the use of "searchlights" on electric cars. The order is issued on the petition of the Selectmen of the town of Wellesley, but has a bearing on any company in the State using lights of this kind. The Commission says:

"A railway in or along the side of a highway offers oppor-

tunities for obstruction that are not offered by railways which are constructed over private lands. To meet these conditions the cars upon some lines have of late been equipped with a powerful arc light as a safeguard against accident.

"It has been said that this street car light is no more objectionable than some of the lights used on automobiles. We cannot accept that statement; but if it were true the comparison is not profitable. The fact that other lights may be an annoyance or menace to people using old-time methods of going abroad at night does not justify us in approving a further invasion of their rights.

"It is true that there is a public demand for high speed on these railways, and this undoubtedly makes it necessary in the interest of safety to throw light a considerable distance ahead of the car. If to do this an arc light of high candle-power is to be used companies must take prompt action to provide a suitable device for so governing the direction of the light as to confine the effect of its high power to the track. Meanwhile they should turn off or obscure the light while cars are moving through streets otherwise well lighted or through thickly settled communities."

Liverpool Overhead Railway.

This electric railway has been severely hit by the competition set up by the electrification of the Liverpool-Southport line of the Lancashire & Yorkshire. There have also been severe losses of traffic suffered from municipal tramways' rivalry. Receipts per train mile are now much lower than on other English electric lines. The following comparative figures are given of the earnings per passenger and per train mile, on this and certain other lines:—

Company.	Receipts Per passenger.	Per train mile
Liverpool Overhead	3.56 cts.	41.82 cts.
City & South London	3.66 "	61.58 "
Central London	3.66 "	133.60 "
Mersey Tunnel Railway	3.58 "	50.70 "

The closing of four of the smaller stations is now under consideration.

Russian Railroad Earnings.

The official report on the business of the Russian railroads for the first half of 1905 shows a slight increase in total gross earnings, but a very slight decrease in earnings per mile. Passenger traffic decreased about 5 per cent., but freight shipments increased 2.7 per cent. The number of passengers on the lines in Asia decreased 8½ per cent., and the tons of freight carried on these lines increased 37 per cent. This does not include military traffic.

Pennsylvania Railroad Pensions.

The Pennsylvania Railroad Pension Department, which seemingly was established but yesterday, has been running six years, and has paid to pensioners $2,004,088, and 890 pensioners have died. The payments have been (years ending December 31; all lines East of Pittsburg and Erie): 1900, $244,020; 1901, $292,290; 1902, $328,403; 1903, $359,374; 1904, $390,000; 1905, $390,000.

During the six years 2,700 employees have been retired as pensioners from the active service of the company. Of the total number retired, 688 were between the ages of 65 and 69 years, of whom 546 were retired on their own request with the approval of the employing officer.

Steam Motor Car of the Great India Peninsula Railway.

With a view to provide a frequent, speedy and economical train service on certain of its country branches and also to supplement the existing train services on some of its urban sections, the Great India Peninsula Railway has placed in operation a steam motor car made by Messrs. Kerr-Stuart & Co., London. The car is of a similar design to those made by the same company for the Great Western Railway, of England. The cylinders are 9 in. by 15 in., the driving wheels are 3 ft. 5 in. in diameter, the total heating surface is 353 sq. ft., to which the tubes contribute 306 sq. ft. and the fire-box the remaining 47 sq. ft. The grate area is 8.75 sq. ft. The inside fire-box is composed of copper, the sides, crown and back plates being half inch thick and the tube plates are three-quarters of an inch in thickness. The tubes are of solid drawn brass, 1½ in. in diameter. The working pressure of the boiler is 170 lbs. per sq. in. The valve gear is of the Walschaert type. The tank is placed at the end of the underframe and has a capacity of 550 gallons. The coal bin is located in front of the engine cab and has a capacity for 15 cwt. of coal. The locomotive portion and the underframe was shipped to India, where the car body was made and fitted to the underframe by the railroad company. The car body is 48 ft. long by 10 ft. wide. It has a capacity for seating 50 third-class passengers and 6 first-class passengers. The total length of the car is 60 ft. over buffers, and the total wheel base is 51 ft. 6 in.

Derailment on the Atchison.

Westbound passenger train No. 1 of the Atchison, Topeka & Santa Fe, was derailed on Monday morning, March 5, near Toltec, N. Mex., 80 miles west of Albuquerque, injuring twelve men, three of whom may die. The train was going at about 30 miles an hour when the engine jumped the track and took with it the six coaches, three of which turned completely over. The parlor car and a private car remained on the tracks. Most of the injured were in the forward coach.

Spring Styles for Rear Brakemen.

"Red neckties are always worn by foreign brakemen and conductors. Ever notice it?" said a railroader.

"No. Why is it?"

"As a safety device," was the reply. "These red neckties that flash upon your gaze on the railroads of Italy, France, Germany and England are not a sign that the people have a gay taste, but that they are cautious and prudent.

"They are supplied free by the railroad companies for use as danger signals in emergency. Thus, no matter when or where an accident may happen, there is no need to search or scramble for a red flag. The brakeman whips off his red necktie and waves it frantically aloft."—*Exchange.*

Gravity Yard for the Peoria & Pekin Union.

The Board of Directors of the Peoria & Pekin Union Railway have authorized the construction of a gravity yard in East Peoria, containing 23 miles of tracks, and involving about 140,000 cu. yds. of excavation and 2,000 cu. yds. of concrete. Bids for the work are asked until March 20, noon. Plans and specifications can be seen at the office of the Chief Engineer, Room 31 Union Station, Peoria, Ill.

Manufacturing and Business.

The Chicago, Milwaukee & St. Paul is to install a 225-k.w. Allis-Chalmers type "I" generator at its West Milwaukee shops.

The Farlow draft-gear attachments have been specified for 2,000 Atlantic Coast Line cars in combination with the Westinghouse friction draft gear.

The Cherry Valley Iron Works, West Middlesex, Pa., is installing a 15-ton, 46-ft. span Northern crane made by Northern Engineering Works, Detroit, Mich.

The Roanoke Bridge Co., with office at Roanoke, Va., has been incorporated with $50,000 capital to build bridges. E. C. McComb is President and Treasurer, and S. H. Holland, Secretary.

The Buda Foundry & Mfg. Co., Chicago, has recently erected a new warehouse and built an addition to its foundry in order to facilitate the handling of its business, which has greatly increased. A day and a night shift are now being worked.

Copeland & Grenier, Endicott Building, St. Paul, Minn., have formed a firm to handle tool steel, copper tubes and general railroad supplies. They also represent the Block-Pollak Iron Co. The members of the firm were formerly with the Rock Island.

Arthur Giesler, formerly Chief Engineer and designer for the Platt Iron Works Co., Dayton, Ohio, has opened offices at 170 Broadway, New York, as a Consulting Engineer, and will devote his time to the specialty of hydro-turbine power plants and hydro-turbine pumping machinery.

The Pittsburg Railway Company has ordered 20 emergency straight air-brake equipments from the General Electric Company, Schenectady, N. Y. The cars upon which these equipments will be mounted are to be run singly and in two car trains, consisting of one motor car and one trailer.

The College of Engineering of the University of Wisconsin has just received a 35-h.p. Curtiss steam turbine. The new machine, which is in part the gift of the General Electric Co., is being installed in the mechanical laboratory of the engineering building, where it will be used for the instruction of students and for experimental work.

At a meeting of the Board of Directors of the Railway Steel-Spring Company, New York, held on March 1, 1906, Julius E. French, formerly President, was elected Chairman of the Board; William H. Silverthorn, formerly one of the Vice-Presidents, was elected President; F. F. Fitzpatrick was re-elected Vice-President; Frank Carnahan was elected Treasurer to succeed Mr. James C. Beach, who has retired. M. B. Parker was re-elected Secretary, as were also T. L. Chapman, Jr., and A. S. Henry, Assistant Secretaries. T. L. Chapman, Jr., was also elected Assistant Treasurer.

The Quincy, Manchester, Sargent Company has been incorporated and will take over the business heretofore operated by the Railway Appliances Company. This includes the business and plant of the Railway Appliances Company at Chicago Heights, Ill., formerly owned by the Q. & C. Company, also the business and plant of the Pedrick & Ayer Company, of Plainfield, N. J., manufacturers of locomotive repair tools, electric and pneumatic hoists and cranes and pneumatic riveters. The Quincy, Manchester, Sargent Company will also act as sole selling agent for the product of the Elastic Nut & Bolt Company, of Milwaukee, Wis.

Iron and Steel.

The Carnegie Steel Company is said to be building some 1,500-ton steel barges to carry rails and structural iron to the southwest.

The *Iron Age* says that this year is proving a very satisfactory one for girder rails, the demand for which has for some years been very light.

In addition to 11,000 tons of rails bought by the St. Louis & San Francisco, many orders are being placed by electric traction companies for standard and light sections.

The Wabash has bought about 10,000 tons of rails to be used on its lines east of Toledo, where a considerable amount of double-tracking is to be done and light rails to be replaced with those of heavier section. This work is to be carried out during the present spring.

The rolling mills at Laramie, Wyo., recently started work under the direction of W. H. B. Jacobus, of Omaha, Superintendent, and A. H. Fetters, Mechanical Engineer. The mills have a number of large orders, including one from the Union Pacific for 100,000 tons of angle bars to be used on its Wyoming division. The mills are controlled by the Harriman interests.

The Erie is about to let orders for 3,000 tons of steel for new bridges, and the Lehigh Valley is also about to place a similar order. Orders for about 200,000 tons of structural material will be let in New York before May 1. This includes 40,000 tons that will be needed for the Manhattan bridge, and about 30,000 tons to be used in the Hudson river tunnels. The American Bridge Co. has orders for 1,200 tons for new buildings for the American Ship Building Co. and also has an order for 3,500 tons for delivery on the Pacific coast.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Chicago Terminal Transfer.—F. B. Huntington has been appointed Comptroller, succeeding S. L. Prest, resigned.

Nashville, Chattanooga & St. Louis.—John W. Thomas has been elected President and General Manager, succeeding J. W. Thomas, deceased. H. F. Smith has been elected Vice-President and General Traffic Manager. E. C. Lewis, Acting President, has been elected Chairman of the Board of Directors.

Norfolk & Southern.—W. L. Bird has been appointed Auditor, succeeding G. M. Glazier, resigned.

Pittsburg & Lake Erie.—B. C. Vaughn, Assistant to the Vice-President, has resigned, and the office has been abolished.

Operating Officers.

Chicago, Burlington & Quincy.—J. E. Votaw, who was recently appointed Superintendent at Brookfield, Mo., began railroad service as an operator on the C., B. & Q. in 1882. The next year he went to the Wabash as operator and despatcher, but returned to the Burlington in 1885 as despatcher. Three years later he was made chief despatcher and trainmaster, which position he has held until his recent appointment.

Chicago Terminal Transfer.—J. L. Nichols has been appointed Superintendent.

East Carolina.—Walter Rutland has been appointed Superintendent and Auditor, with office at Tarboro, N. C.

Louisville & Nashville.—A. B. Bayless, Trainmaster of the Birmingham and Alabama Mineral divisions, has been appointed Assistant Superintendent at Blue Ridge, Ga.

Southern.—C. C. Coffee, Engineer of Maintenance of Way at St. Louis, Mo., has been appointed Superintendent of the St. Louis division of the St. Louis-Louisville Lines, with office at Princeton, Ind., succeeding A. M. Smith, resigned. J. F. Sheridan has been appointed Assistant Superintendent at Princeton, Ind.

Traffic Officers.

Pennsylvania.—Robert C. Wright, who was recently appointed General Freight Agent in charge of local traffic, entered railroad service as a messenger on the Northern Central in 1888, having graduated the year before from the Baltimore City College. The next year he was appointed clerk in the office of the General Agent at Baltimore, where he remained until 1897, when he was made Soliciting Agent of the Star Union Line, at Baltimore. Two years later he was appointed special agent in the office of the General Superintendent of Transportation of the Pennsylvania, being made, after a few months, Division Freight Agent of that road at Altoona, Pa. In 1901 he was transferred to Harrisburg, Pa., with the same title, and in 1903 was appointed Assistant General Freight Agent, which position he held until his recent appointment.

New York Central & Hudson River.—J. F. Fairlamb, who was recently appointed General Passenger Agent of the New York Central & Hudson River Railroad and leased lines, was born in Pennsylvania in 1855. He was educated at Chester Academy and entered railroad service in 1874 as a clerk in the auditing department of the Pennsylvania. Ten years later he was appointed chief clerk to the Auditor of Passenger Receipts of the New York, West Shore & Buffalo. In 1886 he was made clerk in the office of the Auditor of Passenger Accounts of the New York Central, being promoted the next year to chief clerk. In 1888 he was appointed Assistant Auditor of Passenger Accounts and in 1890 Auditor of Passenger Accounts. He was on March 1st transferred to the traffic department as General Passenger Agent.

J. F. Fairlamb.

Engineering and Rolling Stock Officers.

Cincinnati, Hamilton & Dayton.—A. C. Hinckley, Master Mechanic, has been appointed to the new office of Superintendent of Motive Power.

New York Central & Hudson River.—Edward Elden has been appointed Master Mechanic at East Buffalo, N. Y., succeeding William Smith, resigned.

Pennsylvania.—E. B. Temple, Assistant to the Chief Engineer, has been appointed Assistant Chief Engineer. J. F. Murray succeeds Mr. Temple.

Pennsylvania Lines West.—A. W. Grosvenor, Assistant Engineer of Maintenance of the Western Division of the Northwest System, has been transferred to New York, in connection with terminal improvements. A. S. Bland succeeds Mr. Grosvenor.

St. Louis, Iron Mountain & Southern.—C. A. Brann has been appointed Master Mechanic of the Arkansas division, with office at Baring Cross, Ark. This appointment does not displace any of the three master mechanics already at Baring Cross.

Southern.—Edward Gray has been appointed Engineer of Maintenance of Way of the St. Louis-Louisville Lines, with office at St. Louis, Mo., succeeding C. C. Coffee, promoted.

Purchasing Agents.

Chicago Terminal Transfer.—A. C. Emery has been appointed Purchasing Agent.

LOCOMOTIVE BUILDING.

The Guayaquil & Quito has ordered 12 locomotives from the Baldwin Works.

The Italian Government has ordered 20 locomotives from the Baldwin works.

Zeigler Coal Company, Zeigler, Ill., has ordered three locomotives from the Baldwin Works.

The Atlanta & West Point, it is reported, has ordered five locomotives from the Rogers Locomotive Works.

The Duluth & Iron Range, it is reported, has ordered eight switching locomotives from the Baldwin Works.

The State Railway of Chile has ordered one 15-in. x 22-in. Mogul locomotive from the Lima Locomotive & Machine Co.

The Erie has ordered 25 Pacific type locomotives from the American Locomotive Co., delivery to begin in March, 1906.

Kilpatrick Brothers & Collins, Omaha, Neb., have ordered one 45-ton Shay locomotive from the Lima Locomotive & Machine Co.

The Nitrate Railway Company, Iquique, Chile, has ordered one 80-ton Shay locomotive from the Lima Locomotive & Machine Co.

The Syndicate de Orbas Publicas, Chile, has ordered two 12-in. x 18-in. Mogul locomotives from the Lima Locomotive & Machine Co.

The Buffalo, Rochester & Pittsburg has ordered four Atlantic

type locomotives and 10 consolidation locomotives from the American Locomotive Co.

The Ferro-Carril de Guantanamo (*Guantanamo R. R. Co.*), Guantanamo, Cuba, will shortly be in the market for two eight-wheel (4-4-0) type locomotives having a total weight of about 90,000 lbs., with cylinders 17 in. x 24 in.; two mogul locomotives (2-6-0) type, having a total weight of about 95,000 lbs., with cylinders 17 in. x 24 in., and two (0-6-0) type switching locomotives, with a total weight of about 65,000 lbs. Address Richard Brooks, Chief Engineer, Guantanamo, Cuba.

The Texas Central has ordered four simple consolidation (2-8-0) locomotives from the American Locomotive Co., for July delivery. These locomotives will weigh 135,000 lbs., with 120,000 lbs. on the drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 51 in.; wagon top boiler, with a working steam pressure of 180 lbs.; heating surface, 1,939 sq. ft.; charcoal iron tubes, 2 in. in diameter and 12 ft. 6 in. long; steel firebox, 104⅛ in. x 42⅞ in.; grate area, 31 sq. ft.; tank capacity, 4,500 gallons, and coal capacity, nine tons. The special equipment includes: Westinghouse-American air-brakes, Ohio injectors and American driving wheel tires.

CAR BUILDING.

The Alaska Central is asking prices on 15 flat cars.

The Chicago, Burlington & Quincy is about to order 1,000 box cars.

The Chicago Great Western is asking bids on 1,000 box and stock cars.

The National Car Line Co., Chicago, is figuring on building 50 cars at its own shops.

The Marion, Bluffton & Eastern Traction Co., Bluffton, Ind., has ordered eight cars.

The Pere Marquette has ordered 2,000 box cars of 80,000 lbs. capacity from the Pullman Co.

The Southern is in the market for upwards of 40 cars, including baggage, passenger and postal cars.

The Pennsylvania, it is reported, has ordered 11 additional electric cars for its West Jersey & Seashore line.

The Chicago, Lake Shore & Eastern is in the market for 500 steel underframe gondola cars of 100,000 lbs. capacity.

The Groton & Stonington Street R. R. (*Electric*), Mystic, Conn., has ordered two interurban cars from the Jewett Car Co.

The Norfolk & Western is in the market for 500 gondola cars in addition to the 3,500 reported in our issue of February 16.

The Baltimore & Ohio will shortly order a large amount of new freight equipment, but nothing definite has yet been decided.

The Nashville, Chattanooga & St. Louis will build 200 box cars in its own shops. Orders have already been placed for the material.

The O. F. Jordan Co., Chicago, has ordered, since January 1, 11 specially built flat cars from F. M. Hicks & Co. for their spreaders.

The Fairmont & Clarksburg Traction Company (*Electric*), Fairmont, W. Va., has ordered 10 interurban cars from the Jewett Car Co.

The Eureka & Palisade has about decided to build some hopper bottom cars at its Palisade shops, but will probably purchase trucks already built.

The Illinois Central will build 50 cars in its own shops. Thirty of these will be gondola cars and the remaining 20 will be box cars, all of 80,000 lbs. capacity.

The Pennsylvania Lines, it is reported, are about to place an order for 166 passenger, baggage, mail and express cars for the lines east of Pittsburg, and 68 cars of a similar type for the lines west of Pittsburg.

The Ferro-Carril de Guantanamo (*Guantanamo R. R. Co.*), Guantanamo, Cuba, will shortly be in the market for seven passenger coaches, 40 box cars of 60,000 lbs. capacity, and 60 flat cars of 60,000 lbs. capacity. Address Richard Brooks, Chief Engineer, Guantanamo, Cuba.

The Orange & Northwestern has ordered 50 logging cars from the Orange Iron Works, and 50 logging cars from the Beaumont Iron Works, all of 60,000 lbs. capacity. All cars will weigh 20,000 lbs., and measure 36 ft. long, 10 ft. wide and 32 in. high, over all. The special equipment includes Dickinson wheels.

The Boston Elevated has ordered 45 "Easy-Access" steel cars from the Pressed Steel Car Co., for its elevated service, to be delivered in August and September, 1906. These cars will seat 48 passengers and will weigh about 36,000 lbs. The overall dimensions will be 46 ft. 7 in. long x 8 ft. 7 in. wide. The order for the trucks has as yet not been placed.

The National of Mexico will build at its own shops 150 gondola cars of 36-tons capacity, 100 flat cars of 36-tons capacity, and 15 cabooses, and is also in the market for 300 box cars of 80,000 lbs. capacity; five combination baggage and express cars; three third class, three second class and three first class coaches, all to be equipped with vestibules.

The Georgia Southern & Florida has ordered three 60-ft. express cars of 60,000 lbs. capacity from Barney & Smith, not freight cars, as reported in our issue of March 2. The special equipment for these cars will include: Diamond special brake-beams, Westinghouse air-brakes and draft rigging, Ajax brasses, Janney couplers, Gold heating system and Symington journal boxes.

The Chicago Great Western, as reported in our issue of February 23, has ordered 280 36-ft. box cars and 100 36-ft. furniture cars of 70,000 lbs. capacity from Pullman, and 320 36-ft. stock cars of 60,000 lbs. capacity from F. M. Hicks & Co. The special equipment for the box and furniture cars includes: Security doors, McCord journal boxes, Chicago roofs and Barber trucks. The special equipment for the stock cars includes McCord journal boxes.

The Mexican International, as reported in our issue of January 19, has ordered 300 gondola cars of 80,000 lbs. capacity from the South Atlantic Car & Manufacturing Co., for April 1 to May 15 delivery. The special equipment will include the Pennsylvania Brake-Beam Company's brake-beams, Westinghouse air-brakes, Tower couplers, Miner draft rigging, Symington journal boxes, Railway Steel-Spring Company's springs, and American Steel Foundries trucks.

The Boston & Maine has just let a contract to the Pressed Steel Car Co. for 1,000 box cars of 60,000 lbs. capacity, for October, 1906, delivery. These cars will weigh 31,700 lbs. and will measure 36 ft. long inside. The bodies and underframes will be of wood. The special equipment will include the Pressed Steel Company's bolsters and pedestal trucks, Simplex brake-beams, Westinghouse air-brakes, lead lined brasses, Gould couplers, Miner tandem draft rigging, and Railway Steel-Spring Company's springs.

The Erie, as reported in our issue of Feb. 23, has ordered 25 suburban passenger coaches from the St. Louis Car Co., for June 1, 1906, delivery. These cars will have a seating capacity for 70 passengers, and they will measure 66 ft. 7 in. long x 10 ft. wide x 14 ft. 6 in. high over all. The bodies and underframes will both be of wood. The special equipment will include Simplex bolsters, American Brake-Shoe & Foundry Company's brake-shoes, Westinghouse high-speed air-brakes, Climax brasses, Buhoup three-stem couplers, National curtain fixtures, Dayton door fastenings, Miner draft rigging, Gold heating system, M. C. B. malleable iron journal boxes, standard steel platforms, canvas roofs, four-wheel trucks, Pullman vestibules and Standard steel wheels.

BRIDGE BUILDING.

ALBANY, N. Y.—A bill has been introduced in the New York State Senate authorizing the Governor to negotiate with the New Jersey authorities to secure legislation and the appointment of a joint commission to buy the necessary land or water rights for building one or more bridges over the Hudson river from New York City to various points in New Jersey, at the joint expense of both states.

ATLANTA, GA.—It has not been definitely decided whether contract will be let to Grant Wilkins, of Atlanta, Ga., at his bid of $134,587 for the complete Washington street viaduct, or to the Oliver Co., at Knoxville, Tenn., at their bid of $184,587.

BESSEMER, MICH.—Bids will be asked by the Township Board of Marenisco, Gogebic County, over the Presque Isle river. George Rupp, Bessemer, may be addressed.

CHARLOTTE, N. C.—A contract has been given to the Virginia Bridge Co., of Roanoke, Va., for building a two-span steel bridge 25 ft. wide on concrete abutments over Sugar creek on East Fourth street.

CINCINNATI, OHIO.—Plans are being made for rebuilding the Cincinnati Southern bridge over the Ohio river, at a cost of about $1,500,000.

FLORENCE, ALA.—A contract is reported let for building a new steel bridge over the river at this place. The bridge is to carry three tracks. It will cost about $500,000.

FOREST CITY, ARK.—A company has been organized, with $40,000 capital, to be known as the Madison Bridge Co., to build a highway bridge over the St. Francis river near Madison. John Gatling is President and T. C. Morwin, Secretary.

Gloucester, Mass.—Bids are wanted March 14 by the County Commissioners at Salem for building a rolling lift bridge over the canal at Gloucester, Mass. James P. Hale is Clerk of the County Commissioners.

Grand Rapids, Mich.—A resolution has been submitted to the Board of Aldermen for permission to issue bonds for $66,000 to build a bridge from Ann to Victoria streets.

Medicine Hat, Assin.—The Alberta Government has decided to spend $50,000 for building the foundations and abutments for a highway bridge over the South Saskatchewan river at this place.

New Haven, Conn.—The New York, New Haven & Hartford, it is said, has let a contract at $600,000 for building a number of steel bridges, six of which will be over the New Haven cut.

Salem, Mass.—The towns of Salem and Beverly will shortly ask bids for building a bridge 1,200 ft. long, with a draw, to cost $100,000, over the Danvers river. James P. Hale, Salem, Mass., may be addressed.

San Diego, Cal.—The Board of Public Works recommends three new steel bridges to replace the present wooden structures, at a cost of about $25,000.

San Francisco, Cal.—The city officials have under consideration the question of building a reinforced viaduct 1,000 ft. long on Mission street between Bosworth and Marshall streets. The City Engineer's plans place the estimated cost of the structure at $250,000.

Sioux City, Iowa.—The Great Northern, it is said, is planning to build a bridge here.

Toledo, Ohio.—A resolution has been introduced in the City Council to authorize a new concrete steel bridge to be the full width of the street at Cherry street, to replace the present structure.

Tulsa, Ind. T.—The Single Statehood Bridge Co. has been organized to build a bridge over the Verdigris river near Nowata, on which work is to be started at once. Incorporators include: M. B. Baird, T. G. Sanders and H. B. Talley.

Other Structures.

Allegheny, Pa.—The Baltimore & Ohio, according to the newspaper reports, has decided to build a new station on the site of the present Pittsburg & Western station at this place, to cost about $1,000,000.

Birmingham, Ala.—The Birmingham Terminal Co. has been granted franchises and will at once begin work on a new passenger station to cost about $1,500,000.

Brunswick, Ga.—The Atlantic & Birmingham will ask bids March 5 for building terminals here to cost $200,000. The contracts are to be let by the Fore River Ship Building Co., of Quincy, Mass.

Chattanooga, Tenn.—According to local reports, work is to be started early in April on a new passenger station for the Southern Railway, to cost about $300,000.

Eldorado, Kan.—The Atchison, Topeka & Santa Fe is planning to put up a new passenger station here.

Lawrence, Mass.—The Boston & Maine, it is said, has bought a large plot of ground as a site for a new freight house and yard.

Memphis, Tenn.—The Southern Railway, it is said, has started work on two large storage warehouses, at a cost of $100,000, and is making repairs at the present freighthouse to cost about $25,000 and $30,000 additional.

New York, N. Y.—There are rumors that the Pennsylvania and the New York, New Haven & Hartford are planning to put up a union passenger station on the block between First and Second avenues, between 126th to 127th streets.

Salt Lake City, Utah.—The Denver & Rio Grande and the Western Pacific are planning to put up a stone passenger station to cost about $200,000.

Springfield, Mo.—The Missouri Pacific, it is said, will build a new passenger station here to cost about $18,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

American of Porto Rico.—An officer writes that this company is now building a new line to connect its two main lines, so as to furnish a through route from San Juan to Ponce, which are 170 miles apart. The new line, which is being built between Camuy and Aguadilla, over a rough country, will have grades of 2 per cent. The work is very heavy and considerable blasting has been necessary. The line crosses a number of small streams and deep canyons, over which many small and a few large bridges will be built, the largest of which will be about 500 ft. long. There will also be two tunnels. About 14 miles is completed and the remaining 13 will be finished this fall. The new line passes through the towns of Isabella and Quebradillas, through a fertile section. The work is being done by the company's men. George Servajeau, Isabella, is the Engineer in charge of construction.

Ashcroft, Barkerville & Fort George.—Application is being made by a company under this name for a charter to build a railroad in British Columbia, from Ashcroft to Fort George, approximately 300 miles. C. S. Riley, H. C. Crowe and others, of Winnepeg, Man., are interested.

Augusta, Waterville & Oakland (Electric).—Incorporation has been asked for by this company, in Maine, with a capital of $75,000, to build a street railroad through Oakland and Sydney to Augusta, about 18 miles. The directors include: E. G. Lawrence, A. B. Gerald, S. A. Nye, of Fairfield, Me., and C. W. Davis and R. M. Gilmore, of Waterville.

Baltimore & Ohio.—Announcement is made that this company will make improvements in the Pittsburg district including new terminals and freight station, at a cost of $2,000,000 instead of $500,000, as originally intended. Other improvements are to be made along the line of its road in the same district.

Beaumont Terminal.—Under this name a company has been organized in Texas, with a capital of $20,000, to build a belt line around the city of Beaumont, to provide additional facilities for the Beaumont, Sour Lake & Western, which is controlled by the Colorado & Southern. The Directors include: R. C. Duff, W. F. Keith, G. A. Clark and others of Beaumont.

Bella Coola & Fraser Lake.—A. P. Lexton and Edgar Dewdney, of Victoria, B. C., are petitioning for a charter for a company under the above name to build a railroad from the mouth of the Bella Coola river, B. C., to Fort George on the Fraser river, approximately 400 miles.

Brooklyn Rapid Transit.—This company is planning to build four new electric surface roads in Brooklyn, N. Y., in and around the Twenty-sixth ward. Application has been made for franchises to cover the work. One of the proposed lines is to be an extension of the present Church Avenue Line, another a George Avenue Line, and to other lines on Liberty avenue.

Canadian Roads.—A number of Chicago and English capitalists, represented by Edward Copps, of Detroit, are planning to build a railroad from the north shore of Lake Superior to Hudson Bay.

Chicago, Indianapolis & Louisville.—See Indianapolis & Louisville.

Copper River & Telkwa.—Under this name a company has applied for a charter to build a railroad from the mouth of the Copper river, in British Columbia, to the mouth of the Telkwa river, about 210 miles. H. D. Lawson, E. V. Bodwell and James H. Lawson, all of Victoria, B. C., are interested.

Dawson, Grand Forks & Stewart River.—This company, incorporated in England with a capital of $2,500,000, to own and operate the Klondike Mines Railway Co., of Canada, has filed a mortgage on the completed road from Klondike City and Dawson to Sulphur Springs, about 30 miles. This section is to be completed in October of this year. The road is ultimately to be extended to the Stewart river, a total distance of 84 miles.

Denver & Rio Grande.—This company is rebuilding and straightening the line and laying double-track between Pueblo and Florence, Colo. This part of the road is between high cliffs along the Arkansas river. The cost of the work will be about $1,000,000.

Detroit Roads.—Application is being made by a company in which Mayor Codd and Frank C. Andrews of Detroit, Mich., and Pendergast & Rawson, of New York, are said to be interested, for a charter to build a subway and a system of connecting surface lines in Detroit, Mich., to compete with the Detroit United Railway. The new company promises three-cent fares and universal transfer.

Gilpin & Clear Creek District.—Under this name a company is being organized in Colorado, with a capital of $600,000, to build a railroad from Central City, Colo., to Pactolus, about 90 miles. The proposed road will traverse a rich mining section. B. E. Seymour, E. R. Fouts, W. H. Stull and others, of Central City, are interested.

Guantanamo, Cuba.—An officer writes that this company, which operates a line in Cuba, has just completed 15 miles of road and that surveys are in progress for an extension of the main line to La Maya, an additional 25 miles. Construction work is to be commenced early in May, but contracts have not as yet been let. The work is not heavy, maximum grades being 1.5 per cent., and maximum curves 8 degrees. There will be two large steel bridges and about 12 small ones. Robert Mason, Santiago de Cuba, is President, and Richard Brooks, Guantanamo, is Chief Engineer.

HILLSBORO NORTHWESTERN.—This company has filed a notice in Wisconsin that it will build an extension from Hillsboro to Richland Center, 28 miles.

HUDSON RIVER & EASTERN TRACTION.—Incorporation has been granted this company in New York to build an electric railroad from the New York Central tracks in Ossining, N. Y., through Briarcliff Manor, Pleasantville and Sherman Park, about nine miles. The incorporators include: L. B. Grant, R. W. Yates, H. E. Keeler, A. T. Cole and others, of New York.

INDIANAPOLIS & LOUISVILLE (C., I. & L.).—This company, recently organized by the Chicago, Indianapolis & Louisville, has filed a mortgage with the Standard Trust Co., of New York, as trustee to secure an issue which will be guaranteed by the C., I. & L. to secure funds to build a line from a point at or near Indianapolis to Evansville, Ind.

KLONDIKE MINES.—See Dawson, Grand Forks & Stewart River.

LOUISIANA & ARKANSAS.—An officer writes that grading has been completed on the Alexandria extension from Packton to Alexandria, La., 36 miles, and track laid for a distance of 10 miles from Packton. M. T. Tousey, of Winfield, La., is the contractor.

LOUISVILLE & INDIANAPOLIS TRACTION.—Rights of way have been secured by this company for building its proposed railroad from Jeffersonville, Ind., north to Seymour, about 60 miles, where connection is to be made with a line already completed as far south as Columbus and now under construction to Seymour. I. N. Perry, John Long, C. B. Casurbur, of Memphis and Henryville, are interested.

MAINE ROADS.—Negotiations are under way for consolidating several electric roads in Maine. The companies to be included in the merger are the Portsmouth, Dover & York and the Atlantic Shore Line. The latter operates a line between Springvale, Kennebunk and Biddeford, Me. The two lines together operate about 100 miles of road. The recent sale of the Lewiston, Brunswick & Bath Street Railway is believed to be connected with this project. By completing a ten-mile section between York and Kennebunk, now being surveyed, connection will be completed for a chain of electric service from New York to Bath and Lewiston, Me.

MEXICAN ROADS.—A concession has been granted by the Mexican Government to John Lureno Gonzalez Trevenine, of Monterey, to build a railroad from Garza Galau, in the State of Coahuila, to Allende, 75 miles, where connection is to be made with the Mexican International.

MIDDLETOWN & CECILTON.—An officer writes that this company, which is building a line from Middletown, Del., via Warwick to Fredericktown and Georgetown, Md., 12 miles, has given a contract to W. R. Polk & Co., for building from Middletown to Cecilton, nine miles. Grading has been completed for 7½ miles, but no track has yet been laid. On the completion of the track over the section to Cecilton, the company will ask bids for the balance of the road. A branch is also projected to run from Cecilton to a point on Chesapeake Bay, an additional six miles. T. C. Cruikshank is President and W. R. Polk Secretary and General Manager, Wilmington, Del.

MONTGOMERY & HAYNEVILLE.—This road, which runs from Hayneville, Ala., to Morganville, on the Louisville & Nashville, has been completed and put in operation.

NEVADA ROADS.—The route of the road which is being built in opposition to the Las Vegas & Bullfrog branch of the San Pedro, Los Angeles & Salt Lake, is from Ludlow north to Rhyolite, Nev., 158 miles. The line will cross the S. P., L. A. & S. L. at a point about 19 miles south of Ludlow, at the south end of Soda lake, and is to run thence across Soda lake on the west side of Silver Dry lake past the east end of the Ayawartz mountains to Salt Spring, where the Amargosa river will be reached. Seven miles north of Salt Spring the road will enter the Amargosa River canyon, which is eight miles long, where the most difficult part of the work will be encountered. On leaving this canyon the route is to the old borax works near Resting Springs, and from there along the river through Resting Springs and Dry lake until it reaches Ash Meadow, from which point a branch will be run to Death Valley, the Lila C borax mine and the Furnace creek section.

NEW YORK SUBWAYS.—The committee on plans and contracts has reported favorably to the Rapid Transit Commission on the resolution for a subway from Fourth avenue and Fortieth street in Brooklyn, through Fortieth street to New Utrecht avenue to Eighty-sixth street, and thence to Stillwell avenue, along which an elevated structure is to be built to Coney Island.

NORTHERN ALBERTA RAILWAY & COAL COMPANY.—Application is being made to the Legislature by A. J. Arnold, of Windsor, Ont., for permission to build this road, which it is proposed to build from Lethbridge via High river and Calgary to Edmonton, about 500 miles.

PENNSYLVANIA.—This company, according to the annual report, just issued, has work under way as follows:

Extension of the classification yard at Hollidaysburg, Pa., and on an extensive westbound yard at that place.

New yard facilities at the Morrisville, Pa., terminus of the Trenton cut-off.

At Philadelphia the widening and lengthening of the tracks on the south side of the new Broad street station.

At East Liberty, Pittsburg, a new passenger station and new freighthouses.

On the Cherrytree and Dicksonsville a branch line is being built from West Brownsville Junction, up the valley of the Monongahela for a distance of 4.5 miles, where connection is to be made with the Pennsylvania, Monongahela & Southern, which is now under construction for the purpose of further developing the Monongahela Valley.

Other work to be carried out during the present year includes the extension of the four-track system on the Middle and Pittsburg divisions, and revision of alinement and grades in connection with that work. The four-tracking between New York and Pittsburg will soon be complete with the exception of two three-track sections, one seven miles long between Spruce Creek and Tyrone Gorge, and the other one 3.5 miles immediately east of Conemaugh.

The low grade freight line from Yorkhaven on the Susquehanna, eastward to Glenloch, will soon be completed and will furnish an independent route with maximum grades of 0.3 per cent. eastbound and 0.6 westbound between Marysville, west of Harrisburg, and Morrisville, near Trenton, which are 137 miles apart.

Construction will be started at once on an additional freight line about 50 miles long from Morrisville, Pa., to Newark, N. J., and one from Glenloch, Pa., to Philadelphia, 20 miles.

A line is to be built to relieve the Pittsburg division, between Pitcairn and Blairsville, 43 miles, and one between Johnstown and Altoona, 39 miles. It has not decided whether the latter will be used for freight or passenger service. With these changes the company will have a double-track road independent of its four-track main line, from Pittsburg to Philadelphia and New York, with the exception of 96 miles on the Middle division, between Petersburg and Marysville, and a short section between Parkesburg and Thorndale on the Philadelphia division.

Work is under way on the tunnel line into and through the city of New York. All the necessary land for the terminal station in New York City has been bought and for most of that needed for the terminal yard in Long Island City. The contract has been let for building a drawbridge over the Hackensack river between Newark and the Hudson river.

Work is being pushed on the Bergen Hill tunnel which is being driven from both ends.

Work is under way on a power house at the new terminal station, New York City. The tunnels under the city are being driven westward from the main shaft at First avenue and in both directions from the intermediate shafts at Thirty-second and Thirty-third streets between Fourth and Madison avenues. On the East River section, the shields are in place on the Manhattan side and work is in progress towards the river. The shafts on the Long Island side are not yet completed, but considerable work has been done on them and at the eastern portal of the tunnel in Long Island City.

This company has started work on the elevation of the Columbia & Port Deposit Railroad along the Susquehanna river to avoid the damages caused by floods and ice. The road now runs along the river shore, but will be placed upon the side of the hills. At Safe Harbor a stone bridge nearly 100 ft. high will be built over the Conestoga river.

PHILIPPINE RAILROADS.—The Philippine Railway Construction Co. has been incorporated in New Jersey with capital of $1,000,000, to build and operate railroads in the Philippine Islands and elsewhere. The incorporators include: A. C. Wall, 1 Exchange Place, Jersey City; J. P. Carter and E. B. Bruce, 52 William street, New York City.

QUEBEC, MONTREAL & SOUTHERN.—Application will be made to the Dominion Parliament by this company to take over the Quebec Southern, which includes the South Shore, the United Counties, and the East Richelieu Valley Railroads, to complete the line which the South Shore was authorized to build from Noyan Junction to the international boundary, to secure terminal lands and wharfs, and to operate steamers on the St. Lawrence and Richelieu rivers.

SOUTHERN.—This company, it is said, will spend between $200,000 and $300,000 at Hamilton Springs, Tenn., where five miles of track is to be laid and a new turn table built.

TAYGARTS & CHEAT RIVER.—A charter has been granted to a company under this name in West Virginia, with a capital of $20,000, to build a railroad from Cecil on the Baltimore & Ohio, in Taylor County, east to Rowlesburg, in Preston County, about 20 miles. The incorporators include: J. Baumgartner, S. McNiel, C. H. Moran and A. R. Stuart, of Baltimore, and G. H. Clapp, of Aberdeen, Md.

Toledo, Fort Wayne & Indianapolis.—This company has been organized with a capital of $3,000,000, and, it is said, will begin work in April on its proposed road between Toledo and Indianapolis. Rights of way have been secured. W. B. Strang, of New York, is President.

Vanderbilt Roads.—According to newspaper reports, Vanderbilt interests are promoting a project to link electric lines in northern Indiana and southern Michigan, and extend the three-rail system to various points reached by interurban lines. The plans include the operation of electric cars from South Bend to Niles, Mich., over the Michigan Central and the C., C., C. & St. L. to Benton Harbor over the I., I. & I. to St. Joseph, Mich., over the Lake Shore & Michigan Southern temporarily to Elkhart, Ind., and the Lake Erie & Western to Michigan City, Ind.

Wabash.—This company, it is said, will build the Uniontown & Wheeling Short Line, which is to be 68 miles long, from Uniontown, in Fayette County, to Wheeling, W. Va. (See Uniontown & Wheeling Short Line. Nov. 3, p. 144.)

Wisconsin Central.—This company, it is said, is the owner of the Milwaukee Terminal Railroad, which is seeking entrance into Milwaukee, Wis., and is planning to build terminals at that place to cost between $5,000,000 and $7,000,000. The Milwaukee Southern, it is said, is opposing the plans of this company for its terminal site.

Yosemite Valley.—This company is offering for sale bonds to secure funds for continuing work on the line which it is building from a connection with the main lines of the Southern Pacific and Atchison, Topeka & Santa Fe at Merced, Cal., to the Yosemite National Park. F. G. Drum is President.

RAILROAD CORPORATION NEWS.

Allegheny Valley.—See Pennsylvania.

Ann Arbor.—See Detroit, Toledo & Ironton.

Birmingham Railway, Light & Power.—N. W. Harris & Co., New York, are offering for sale $5,000,000 general mortgage refunding 4½ per cent. bonds of 1954. These bonds, after the retirement of underlying bonds on July 1, 1906, will become a first lien on the entire gas, electric light and power business of the company, and on 72 miles of electrical road in Birmingham, Ala.

Brooklyn Rapid Transit.—Gross earnings for the year ended December 31 were $17,493,011, an increase of $2,033,351; net earnings, $7,414,088, an increase of $1,216,344; surplus after charges controls, $2,251,451, an increase of $778,180.

Canadian Pacific.—Gross earnings for the month of January were $4,422,691, an increase of $1,170,189; net earnings, $1,267,234, an increase of $844,565.

Cincinnati, Hamilton & Dayton.—Gross earnings for the year ended June 30, 1905, were $8,008,917, a decrease of $13,314; net earnings, $2,003,951, a decrease of $232,689.

Colorado Southern.—A semi-annual dividend of 2 per cent. has been declared on the $8,500,000 first preferred 4 per cent. non-cumulative stock of this company. The dividend on this stock was passed in the fall of 1904, on account of losses due to the Colorado coal strike, and none has been paid since.

Colorado Southern, New Orleans & Texas Pacific.—This company has made a mortgage to the Central Trust Company to secure $12,000,000 first mortgage 4½ per cent. bonds. The road is under construction between Houston, Tex., and Baton Rouge, La.

Dayton, Springfield & Urbana (Electric).—A. E. Locke, of Boston, who bought this road recently at receiver's sale for $600,000, is reported to have also bought the other "Appleyard" lines.

Detroit, Toledo & Ironton.—This company is to exchange $500,000 consolidated mortgage 4½ per cent. gold bonds for the 5,000 shares of Ann Arbor preferred stock which were not taken up by the D., T. & I. last June, when it acquired a majority of the preferred and common stock of the Ann Arbor.

Great Northern.—This company has taken over the property of the Union Terminal Co., of Sioux City, Iowa, having had an option on it for about a year. The terminal company has $1,800,000 capital stock and $1,250,000 bonded debt, and consists of about 30 miles of road, a union passenger station and other terminals. The purchase price is said to have been $1,250,000.

Havana Electric.—Gross earnings for the year ended December 31, 1905, were $1,504,837, an increase of $257,351; net earnings, $728,785, an increase of $206,045; surplus after charges, $370,921, an increase of $233,313.

Interborough-Metropolitan.—This company, which was recently incorporated as the holding company of the Interborough Rapid Transit, Metropolitan Street Railway and Metropolitan Securities Company, has filed a certificate of increase of capital stock from $15,000 to $155,000,000, of which $100,000,000 is common stock. The plan for the merger has been declared operative, but deposits of stock of the three old companies will be received up to March 16. (Feb. 2, p. 38; Jan. 26, p. 30.)

Kansas City, Mexico & Orient.—This company has applied for authority to issue $10,984,400 bonds to pay for the construction of the Texas section of the road.

Lake Erie & Western.—Gross earnings for the year ended December 31 were $5,025,777, an increase of $27,769; net earnings $1,354,486, an increase of $49,451, surplus after charges $117,660, a decrease of $12,027.

Long Island.—Gross earnings for the year ended December 31 were $7,824,985, an increase of $741,179; net earnings $1,560,349, a decrease of $280,154, surplus after charges $122,528, a decrease of $204,481.

New Jersey & Pennsylvania.—F. V. Pitney, of Morristown, N. J., has been appointed receiver for this road, which runs from Whitehouse, N. J., to Morristown, 26 miles, and has $145,000 stock outstanding and $1,000,000 first mortgage 5 per cent. bonds of 1930.

Pan-American.—George D. Cook & Company are offering for sale $1,000,000 first mortgage 5 per cent. bonds of 1934. About 200 miles of road are now completed and in operation, and it is expected that 300 miles will be in operation within 18 months.

Pennsylvania.—A special meeting of the stockholders of the Allegheny Valley will be held on March 14 to act on the proposal to sell the Allegheny Valley to the Pennsylvania. (Nov. 17, p. 160.)

Pere Marquette.—Gross earnings for the year ended June 30, 1905, were $12,639,420, an increase of $1,236,728; net earnings decreased $971,349. The operating ratio was 78.3, an increase of 10.8 per cent.

Pittsburg, Shawmut & Northern.—The receiver has been authorized to issue $3,800,000 receiver's certificates to provide for extensive improvements and additions.

Quebec, Montreal & Southern.—Permission will be asked from the Dominion Parliament to incorporate a company under this name to acquire and operate the Quebec Southern, the South Shore, the United Counties, and the East Richelieu railroads. This will be a Canadian holding company for the Delaware & Hudson, which recently bought the Quebec Southern.

St. Louis & North Arkansas.—This company having defaulted payment of interest on its $3,065,500 first mortgage bonds, a reorganization committee, consisting of John Scullin, D. R. Francis and others, requests the deposit of bonds with the St. Louis Union Trust Co., preparatory to foreclosure and reorganization.

St. Louis & San Francisco.—Gross earnings for the six months ended December 31 were $21,611,407, an increase of $986,456; net earnings, $7,952,547, an increase of $280,080. Surplus after charges were $1,001,903.

Santa Fe Central.—It is reported that this road has been sold to C. W. Tallmadge, of Chicago, at a price said to be about $2,500,000. The road runs from Santa Fe, N. Mex., to Torrance, 117 miles.

Union Terminal (Sioux City, Iowa).—See Great Northern.

West Jersey & Seashore.—At a meeting of the stockholders held on March 6, an increase of capital stock from $8,076,000 to $10,000,000 was approved. The new stock is to pay for the installing of an electric line between Camden, N. J., and Atlantic City.

Wheeling & Lake Erie.—Gross earnings for the year ended January 30, 1906, were $4,595,607, an increase of $270,325; net earnings, $956,472, a decrease of $93,511. The deficit after charges was $193,360 as compared with a surplus, for the previous year, of $63,654. In commenting on the report, the President says:

"Your directors have the utmost confidence in the ultimate success of the property. The difficulty heretofore has been that the road was too poor to adequately supply itself with equipment or to make necessary improvements to take care of the business at hand. * * * It has not yet begun to receive any considerable benefit from the Wabash-Pittsburg Terminal, and probably not until the latter part of the present fiscal year will the benefits of the Pittsburg extension accrue to any large extent; but it is confidently expected that by the summer of 1906 there will be a very material increase in business derived from this source."